Table of Contents

Executive Summary 1
1. Introduction 3
   1.1 Target Market 3
   1.2 Rationale and Demand for such a Program 4
   1.3 Effect on other University programs 4
   1.4 Administrators who were consulted 4
   1.5 Special tuition or fees to be charged 5
   1.6 Campuses where offered and projected enrollments over the first five years 5
   1.7 Student and Faculty Diversity 5
2. Program Course Requirements 5
   2.1 Prerequisite Skills 6
   2.2 Core 7
   2.3 Electives 8
   2.4 Capstone 8
3. Development of On-Line Courses 9
4. Staffing 9
   4.1 Director 9
   4.2 Course Development 9
   4.3 Staffing of the courses 10
   4.4 Other resource requirements 10
5. Budget 10
   5.1 Assumptions 10
      5.1.1 Course Development 10
      5.1.2 Staffing 11
      5.1.3 Other Resource Requirements 12
   5.2 The Budget 12
      5.2.1 Other Pertinent Budget Assumptions 12
6. Comparison with other Programs and Program Differentiation 16
   6.1 MS in Management Information Systems at the FSBM 16
   6.2 Program Differentiation 18
References 19
Attachments
   Attachment 1: Comparison with Other Programs
EXECUTIVE SUMMARY

General Program Description
The proposed program is designed primarily for people with an undergraduate degree in Information Science and Technology (IS&T). Students with Computer Science (CS) or related degrees who meet the prerequisite skills can also qualify. Students without these prerequisite skills can take 1 or more Computer and Information Science (CIS) department courses that provide the required skill set. The program requires 27 credits from 3 out of 4 Core courses, 5 electives, and a capstone course.

It will be attractive as an MS program to those who have just graduated with such undergraduate degrees or to established professionals desiring to upgrade their skills or who seek a career change.

Inasmuch as application domain knowledge is an important part of this type of degree, students are permitted and even encouraged to take 2 of the 5 electives in other departments. One might then expect that the capstone course would also be oriented in the direction of these electives. In this way, 3 of the 9 courses could be said to be domain oriented.

The goals of the program’s required Core set of courses are to present an in-depth, technical understanding of (1) the processes of software development and its management, (2) systems security and privacy, (3) software systems administration, and (4) advanced and emerging technologies. Beyond this Core the program provides for 5 elective courses and a capstone project in which students can explore their own, more specialized needs. Electives can include courses in the existing CS graduate program, approved courses in other departments, and in time new electives that will be developed specifically to meet current demands of the Information Technology (IT) field.

Rationale for the Program
The Proposed MS in IS&T will prepare students for careers such as systems analyst, systems designer, applications domain expert, systems architect, database or networks administrator, project manager, software developer, internal and external consultant, and quality assurance experts.

The demand for such a degree has been cited in a wide variety of sources in the past few years. The CIS department has also had considerable positive feedback from alumni, including systems security experts, a CIO, a chief technical officer of a large corporation, several software developers, and various members of the CIS Department Advisory Group. But perhaps the most persuasive argument for Temple’s entry into the Masters market in IS&T is the recent report by the Bureau of Labor Statistics (BLS) biennial ten-year (2004-2014) projection for U.S. employment. This projection should encourage IT students and students who are thinking of moving into IT careers. The BLS predicts robust job growth for IT occupations. Although IT no longer dominates the list of fastest-growing occupations, it has four occupations in the top 30. In fact, network systems and data communications analysts represent the fastest-growing job category among all occupations. Here are some relevant growth projections from the BLS report:

- Total labor force growth: 13%
- Network systems and data communications analysts: 55%
- Computer software engineers, applications: 46%
- Network and computer systems administrators: 38%
• Database administrators: 38%
• Computer systems analysts: 31%

Department Infrastructure and Resources
The CIS Department has developed over the last 45 years undergraduate and graduate programs in Computer Science. It has also developed a successful and robust IS&T undergraduate program over the past 8 years. Supporting these academic programs are its own computer laboratories, with technical staff and some 200 workstations in 6 rooms. It can avail itself of a number of teaching modalities, including standard classrooms, smart classrooms at Tuttleman, and up to 6 lab/classrooms. Additional computer lab facilities are available for student use at the Tech Center. As described in the Proposal, the existing IS&T and graduate faculty members comprise the major resource for course development in the proposed program. Some use will also be made of existing courses.

Source of Students
A primary source of students will be the area colleges and universities, including Temple, with undergraduate majors in CS or IS&T. The program is also structured to provide the framework for two types of dual degrees. One is a dual bachelor’s - master’s degree, either CS-IS&T or both in IS&T, as a five year combined program. The second is a dual MS – Ph.D., in which the Master’s would come from this proposed program, and the Ph.D. would come from any science. In this case, the undergraduate degree would most likely be in the science of the intended PhD.

We also expect many students to come from private, public and government sectors in the immediate Philadelphia area. There are large concentrations of such places in center city, the Route 202 corridor, northern suburbs, New Jersey and Delaware. The main campus and Ambler would be the ideal sites for many of these people. Experience has shown that it is easier for us to provide courses on the main campus, where our human and physical resources are concentrated. However, given that a significant market may lie in the northern suburbs and 202 corridor, an extension to the Ambler campus should be considered as soon as demand and resources warrant.

Traditionally, our existing graduate program has attracted many foreign students, and we would expect this source to continue with this program.
1. Introduction

1.1 Target Market
The proposed program is designed primarily for people with an undergraduate degree in Information Science and Technology (IS&T). Students with Computer Science or related degrees who meet the prerequisite skills listed in Section 2.1 can also qualify. Students without these prerequisite skills can take 1 or more CIS department courses that provide the skill set described in Section 2.1.

The program is also structured to accommodate two types of dual degrees. One is a dual bachelor’s - master’s degree, either CS-IS&T or both in IS&T, normally as a five year combined program. The second is a dual MS – Ph.D., in which the Master’s would come from this proposed program, and the Ph.D. would come from any science. In this case, the undergraduate degree would most likely be in the science of the intended PhD. Such students would also have to take the necessary additional prerequisite courses, discussed in the preceding paragraph, to qualify for entry into the MS in IS&T.

The program is targeted to students from all types of organizations and knowledge areas and is structured to provide the flexibility for students with varied backgrounds. Established information technology and computing professionals desiring to upgrade their skills as well as workers seeking a career change will also find this program to their advantage. The size of the target market is extremely large.

The program requires 27 credits from 3 out of 4 Core courses, 5 electives, and a capstone course. It is not a traditional computer science program in the sense of teaching more programming, algorithms, operating systems and networks. Its principal goals, in terms of its Core, are to present an in-depth, technical understanding of (1) the processes of software development and its management, (2) systems security and privacy, (3) software systems administration, and (4) advanced and emerging technologies. Beyond this Core the program provides for 5 elective courses and a capstone project in which each student can explore their own, more specialized needs, which can include graduate courses in programming, networks and operating systems.

1.2 Rationale and Demand for such a Program
The MS in IS&T will prepare students for careers such as systems analyst, systems designer, applications domain expert, systems architect, database or networks administrator, project manager, software developer, internal and external consultant, and quality assurance experts.

The demand for such a degree has been cited in a wide variety of sources in the past few years. The department has also had considerable positive feedback to our degree proposal and to the issue of the need for such a degree from high level practitioners including systems security experts, a CIO, a chief technical officer of a large corporation, several software developers, and a number of members of the CIS Department Advisory Group.

But perhaps the most persuasive argument is the recent report by the Bureau of Labor Statistics. The BLS’ biennial ten-year projection for U.S. employment is the market standard in job projections. This projection fully reflects the dot com bust and recovery and takes off-shoring
into account. This projection should continue to encourage IT students and students who are thinking of growing into IT careers. The BLS again predicts robust job growth for IT occupations. Although IT no longer dominates the list of fastest-growing occupations, it has four occupations in the top 30. In fact, Network systems and data communications analysts represent the fastest-growing job category among all occupations. (Not surprising, as networking is the most important aspect of IT.) Years of cumulative growth have even begun to place IT jobs in the fastest growing category in terms of number of jobs, not just percentage growth. Here are some interesting 2004-2014 projection figures from the BLS report:

- Total labor force growth will be 13%, from 145,612,000 to 164,540,000.
- Network systems and data communications analysts (55%, highest rate of job growth among all occupations; 126,000 jobs added - 3rd highest in number of jobs added)
- Computer software engineers, applications (46%, second highest rate of job growth among all occupations; 369,000 jobs added – highest in number of jobs added)
- Network and computer systems administrators (38%, third highest rate of job growth among all occupations; 107,000 jobs added – fifth highest in number of jobs added)
- Database administrators (38%, fifth highest rate of job growth among all occupations; 40,000 jobs added – tenth highest in number of jobs added)
- Computer systems analysts (31% job growth)
- Computer and information systems managers (26%)
- Computer and information scientists, research (26 %)
- Computer support specialists (23%)
- Computer programmers (2%)

In a web article \(^{1,10}\) by Eric Chabrow of *CIO Insight*, that just appeared on July 7, 2008, it is stated that:

The size of the IT workforce in the United States has topped 4 million workers for the first time last quarter, according to *CIO Insight*’s analysis of U.S. Bureau of Labor Statistics data. Why would IT employment remain robust as unemployment rises in most other job categories? IT performs a critical role in the efficiencies it brings to organizations looking to trim costs—including payrolls—as fuel and related expenditures soar and the economy and dollar weakens. In addition, companies today cannot operate without functioning IT systems, so certain business technology skills cannot be eliminated if a company wants to remain competitive.

Inasmuch as information technology now pervades just about every discipline, persons whose principal occupation is in one of the sciences might benefit greatly from advanced degree knowledge in IS&T as well. We believe that this type of dual skill occupation will become increasingly important both in industry and academia. As briefly described in Section 1.1, such a need can be met by the ability of the proposed program to accommodate the dual MS-Ph.D degree.

1.3 Effect on other University programs

The proposed program does not target the same type of candidate as our existing CS Master’s program. IS&T candidates are interested in IT technical management or applications development as project managers, analysts or programmers. They may also have interdisciplinary career goals. Computer Science candidates are interested in software development, research or a Ph.D degree for teaching or research. However, a number of electives have been identified that could be taken by both candidates, thus working toward a more efficient use of existing resources. In this same regard, students can take 2 of their 5
electives in other departments, such as those in the Fox School of Business and Management (FSBM), thus providing additional credits to those departments.

1.4 Administrators who were consulted
Considerable consultation occurred with Associate Deans Allen Nicholson of CST and Zebulon Kendrick of The Graduate School. The respective Deans of these two schools, Hai-Lung Dai and Aquiles Iglesias were also consulted.

Kathy Szigeti, Science Librarian of the Science, Engineering and Architecture Library requested the list of courses to be offered. She saw no problems in the ability of the Library to support the program with journals and databases.

Other important sources of consultation included Rajan Chandran, William Aaronson and Munir Mandviwalla of the FSBM, who have provided important input to the program.

1.5 Special tuition or fees to be charged
There will be no special tuition or fees. Students will be charged tuition and fee rates per any graduate student in CST. Other means of student support may include research, assistantships, or scholarship awards.

1.6 Campuses where offered, and projected enrollments over the first five years
Present plans are to offer the program initially at the main campus. If demand at Ambler is sufficient, we would consider some course offerings there as well. We expect our student population to come largely from colleges, universities, private, public and government organizations in the immediate Philadelphia area, as well as from Temple itself. There are large concentrations of such places in center city, the Route 202 corridor, northern suburbs, New Jersey and Delaware. The main campus and Ambler would be the ideal sites for many of these people. Experience has shown that it is easier for us to provide courses on the main campus, where our human and physical resources are concentrated. However, given that a significant Market may lie in the Northern suburbs and Route 202 corridor, an extension to the Ambler campus should be considered as soon as demand and resources warrant.

The current enrollment environment in both undergraduate and graduate computer science throughout the country is somewhat depressed, though there are some signs of improvement. Given the higher demand in industry today for IS&T personnel, we can expect somewhat better enrollments, though we must still maintain a conservative view because of the state of computer science, the competition (discussed in Section 8 and Attachment 1), and a new program start-up. Our estimate for first year enrollment is 15 full-time and 40 part-time. In five years this could rise to around 75 full time and 250 part-time if the economy shows a good recovery and demand follows the predictions of the Bureau of Labor Statistics discussed in Section 1.2. This level of enrollment, combined with the expected geographic source of these students, would probably warrant course offerings at the Ambler and Center City campuses.

1.7 Student and Faculty Diversity
Program announcements will be sent to historical Black, Hispanic and women’s organizations. The filling of new faculty positions will consider all candidates based upon merit, regardless of race, gender or nationality.
2. Program Course Requirements
   The program requires 27 credits, coming from 3 out of 4 Core courses, 5 electives, and a capstone course.

2.1 Prerequisite Skills
   Students entering without an undergraduate degree in IS&T must either meet the following prerequisite skills or take undergraduate courses that the department provides in its existing undergraduate program.
   1. Programming
   2. Database Design and Programming
   3. Client-Server Application Programming
   4. Networking and Operating Systems

2.2 Core
   The Core courses are presented in Table 1. Students are required to take any 3 out of the 4 Core courses but can take the fourth as an elective.
<table>
<thead>
<tr>
<th>General Content</th>
<th>Proposed Course Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Management of the development process and operations</td>
<td><strong>5105: IT Process Management</strong></td>
</tr>
<tr>
<td></td>
<td>• Intro to ERP process</td>
</tr>
<tr>
<td></td>
<td>• Project Management</td>
</tr>
<tr>
<td></td>
<td>• Quality Assurance</td>
</tr>
<tr>
<td></td>
<td>• User Support Systems: Documentation, training and help systems</td>
</tr>
<tr>
<td></td>
<td>• Technology planning management and operations</td>
</tr>
<tr>
<td></td>
<td>• Systems Management</td>
</tr>
<tr>
<td></td>
<td>• Database Management</td>
</tr>
<tr>
<td>2 Development processes associated with systems and software</td>
<td><strong>5106: System Development Process</strong></td>
</tr>
<tr>
<td></td>
<td>• Organizational requirements for IT</td>
</tr>
<tr>
<td></td>
<td>• System and software modeling</td>
</tr>
<tr>
<td></td>
<td>• System development methodologies</td>
</tr>
<tr>
<td></td>
<td>• Requirements analysis and specification</td>
</tr>
<tr>
<td></td>
<td>• System architectures</td>
</tr>
<tr>
<td></td>
<td>• Usability Engineering/Human-Computer Interaction</td>
</tr>
<tr>
<td></td>
<td>• Software development tools and productivity</td>
</tr>
<tr>
<td>3 Security and Privacy</td>
<td><strong>5107: Computer and Systems Security and Privacy</strong></td>
</tr>
<tr>
<td></td>
<td>• Networks and security</td>
</tr>
<tr>
<td></td>
<td>• Principles of Cryptography</td>
</tr>
<tr>
<td></td>
<td>• Internet, Intranet, firewalls, VPN, email, wireless</td>
</tr>
<tr>
<td></td>
<td>• Information acquisition, distribution, utilization and privacy</td>
</tr>
<tr>
<td></td>
<td>• Identity theft</td>
</tr>
<tr>
<td></td>
<td>• Financial transaction security</td>
</tr>
<tr>
<td></td>
<td>• Societal value tradeoffs, ethics, and legal issues</td>
</tr>
<tr>
<td></td>
<td>• Computer and networking forensics</td>
</tr>
<tr>
<td>4 Emerging and advanced technologies</td>
<td><strong>5108: Emerging Technologies and Introduction to Tools for Enterprise Management</strong></td>
</tr>
<tr>
<td></td>
<td>• Emerging hardware technologies</td>
</tr>
<tr>
<td></td>
<td>• Emerging software technologies</td>
</tr>
<tr>
<td></td>
<td>• Knowledge Management and Data Mining</td>
</tr>
<tr>
<td></td>
<td>• Decision Support Systems</td>
</tr>
<tr>
<td></td>
<td>• Informatics</td>
</tr>
<tr>
<td></td>
<td>• Artificial Intelligence and Pattern Recognition</td>
</tr>
</tbody>
</table>
2.3 Electives

The student is required to take 5 electives. At least 3 must be in the department and up to 2 can be in another department. An internship may also become an elective or it may be coordinated with the Capstone, but not both. The electives available are:

1. The remaining Core course not taken
2. Any graduate course in the CIS department if necessary prerequisites have been met or with permission of the instructor.
3. A set of eligible courses from other departments will be compiled. Prerequisites or permission of instructor would again apply.
4. Over time, the program will develop its own set of electives in response to perceived specialization requirements and faculty availability. Use of adjuncts from the private sector will be an important resource for new course development. Following is a topical list from which such courses would be developed:

   (1) System and network administration
   (2) Database administration
   (3) Security, privacy, ethics, legal issues and forensics
   (4) Networks and Operating systems
   (5) Knowledge management and Data Mining
   (6) Enterprise Resource Planning (ERP)
   (7) Networked and web application systems
       • User interface design
       • Multi-tier client-server and distributed processing systems
       • Distributed databases
       • Web Services
   (8) Software Engineering
       • System development lifecycle and software modeling
       • Project management, cost estimation and risk management
       • Requirements analysis, domain knowledge and use-ability
       • Interoperability
       • Integrated Development Environments and programmer productivity
       • Quality assurance and maintenance and software testing
       • User documentation, training and help systems

2.4 Capstone

Everyone will complete a Capstone course. It is a project, like a Master’s Project, and is supervised by a faculty member. It will be designed to utilize and demonstrate knowledge of the Foundation, Core and 1 or more of the electives taken. It can also be coordinated with an Internship. Group projects, when properly designed, may be allowed and even be quite useful.
3. Development of On-Line Courses
Many Universities now have some of their courses available online via the internet, but CIS does not. It may be time for the department to move into this arena, and the proposed program would be a good place to start such an initiative; however, considerable research, planning and development are still required. We should know how effective it has been for others and what its cost-benefit would be for us. This proposal provides no plan or budget for such an initiative, but only the idea that once we have the program well underway and can judge its success, we think that online offerings should be explored.

4. Staffing
4.1 Director
A half time Director would be required for a start-up period of 3 years. Initially the Director would do student advising, but if the program became too large a separate, part time advisor would be required.

A valuable resource to the Director and to the Graduate committee that would be formed would be the department’s existing Advisory Group, although the special needs and focus of this program may require some augmentation of that Group or special consultation with a subgroup.

4.2 Course Development
The 4 Core courses would involve new development, though some of our existing courses can provide some of the material. Such courses are CIS 4296: Information Systems Analysis and Design, CIS 4396: Information Systems Implementation, taught by Sorkin and Nosek, and the new CIS 3374: Quality Assurance and Testing taught by Sorkin.

There are also existing faculty who are teaching (or have taught) courses at both the undergraduate and graduate levels in related areas. For example, Sorkin, Wolfgang, Goldstein and Lefkovit have taught CIS 338 and CIS 4339, the CS versions of CIS 3296 and 4396.


The Core courses will require considerably more effort than the Foundation, because new material, not contained in the abovementioned courses, will be needed and new exercises, tests and notes must be developed.

The Electives have no initial cost of development, coming as they do from existing CS courses or a list of eligible courses from other departments. However, as the program attracts students, release time would need to be budgeted for the development of more tailored courses, as presented in Section 2.3. We would expect these to be developed by a combination of adjuncts and NTTs with specific private sector experience, all working in consultation with the MS in IS&T Advisory Group.
4.3 Staffing and course development
Specifics of course staffing and development issues are discussed in the Budget section (5.1.1 and 5.1.2) of this document.

4.4 Other resource requirements
The department has adequate lab facilities to accommodate the additional load of this new program as long as the existing programs remain relatively low, and neither the existing nor new program suddenly increases beyond expectation. We expect that for the next three years any increase in the existing programs as well as the new one will remain at a level where existing lab facilities will be adequate. The only issue here is not equipment, but staff. The entire lab runs on a full time staff of 3 plus student helpers. These are already overloaded, and a new program will put some additional stress on them. An additional lab staff member should be considered for the entire department.

The Library has been consulted, and they have adequate resources to serve the program’s needs. This is also the case for the Tech Center.

5. Budget
The information presented in this section represents our best estimates as to the revenue and expenses for the proposed program over the first three years of its existence. The figures shown are based up a number of assumptions. These assumptions are summarized below, even at the risk of summarizing points made earlier on the document.

5.1 Assumptions

5.1.1 Course Development
The 4 Core courses shown in Section 2 would require considerably more development effort, though our existing courses can provide some of the material. Four courses of release time are requested in the first two years (Years 0 and 1) for the development of these courses.

The Electives can be expected to be developed slowly, largely on an as needed basis, as the program attracts additional students. We estimate 4 courses of release time for this work, one course in each of Years 1 and 2 of the program and two for the Year 3 year. (Note that we expect many students to avail themselves of courses in other departments as well as our own MS/PhD program, thereby keeping the new elective load fairly small.)

A summary of the release time requirements for preparation of new courses is shown in Table 2 below. The release time for at least 2 of the Core courses may need to be taken during the Spring, 2009, or, if necessary, paid for during the Summer, 2009. Each course represents 1/6 faculty effort for the year. There are a total of 9 release units requested.
Table 2: Faculty Course-Section Release Time for New Course Development
(Course-section release time per year)

<table>
<thead>
<tr>
<th>Program Component</th>
<th>Year 0 (08-09)</th>
<th>Year 1 (09-10)</th>
<th>Year 2 (10-11)</th>
<th>Year 3 (11-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electives</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Capstone</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

5.1.2 Staffing – of Courses, Directorship, and Advising
A half time Director would be required for a start-up period of 3 years. Initially, the Director would do student advising, but if the program became too large, a separate, part time advisor would be required. Funds have been allocated below (the equivalent of ½ time for each of the first three years of the program.

The 4 required Core courses proposed in Section will run every semester, once a certain threshold of students is reached. Thus, 1 1/3 FTE faculty will be needed to staff these courses.

Five Electives are needed by a student to satisfy the degree requirement, but 2 may be taken in other departments, 1 may be in the Core, and some may be selected from existing CS MS/Ph/D courses. We expect a need for one elective in the Spring of the first year of the program and an average of four per year (including the capstone) after the first year.

Staffing needs are summarized in Table 3. As is the case for the release time figures in Table 5, each course listed in Table 3 represents a load effort of 1/6. So the first year load effort for staffing will require 2 1/3 faculty for Year 1 and 2 2/3 faculty for years two and three. We believe that this load can be met with existing faculty and the hiring of one additional full-time instructor teaching 6 courses per year.

Table 3: Faculty Course-Section Staffing Requirements for New Program

<table>
<thead>
<tr>
<th>Program Component</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Electives</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Capstone</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Course Upgrade Preparation *</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Release Time (from Table 2)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>14</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

* Release time for course upgrade to maintain course-curriculum currency.
5.1.3 Other resource requirements

We expect that the lab facilities, as they are today and as customarily upgraded annually, will be adequate for the support of the new program. However, from a personnel point of view, an additional lab staff person is essential. The entire lab runs on a full time staff of 3 plus student helpers. They are already overloaded, and a new program will put some additional stress on them. The need for an additional technical staff person has been known for almost a decade. The new program simply accentuates the importance of bringing this new person on board. Since this person is needed to support existing programs, only 10% of the cost of this new staff person has been included in the budget.

5.2 The Budget

The budget figures shown in the following tables reflect the estimated revenues and the costs (based primarily upon course development release time and actual section staffing) associated with offering the program. The hiring of new faculty is not considered here. A key component of the budget is the cost of release time for course development and faculty load effort for course staffing. At this time it is expected that all course development release time and staffing will be attributed to full-time faculty, evenly split between NTTs and TTs. We are aware that some course development and course staffing may involve the use of adjuncts, which will slightly decrease the Expense side of the ledger. Since the degree to which the use of adjuncts is unknown at this time, we believe this assumption of development and staffing by full-time faculty is appropriate.

Table 4 provides a summary of key variance information for the four years beginning 2008-09. As shown the program is expected to break even in Year 2 and show a small cumulative gain by the end of Year 3. College support for the first two years (Year 0, the start up year, and Year 1, the first year of the program) is expected to be around $200,000.

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Budget Variance at End of Year 1 (2009-2010)</td>
<td>($209,065)</td>
</tr>
<tr>
<td>Budget Variance for Year 2 (2010-2011)</td>
<td>($11,135)</td>
</tr>
<tr>
<td>Budget Variance for Year 3 (2011-2012)</td>
<td>$244,244</td>
</tr>
<tr>
<td>Cumulative Budget Variance at End of Year 3 (2011-2012)</td>
<td>$24,044</td>
</tr>
<tr>
<td>Cumulative Revenue for non-CST Schools (end of Year 3)</td>
<td>$293,981</td>
</tr>
</tbody>
</table>

5.2.1 Other pertinent budget assumptions

a. Year 1, 2, and 3 expense figures include estimated average salaries for participating instructors at $90,000 for 2008-09 with 2% increases for across-the-board salary increases.
b. Tuition revenue for Years 1, 2, and 3 assume average tuition increases of 5.8% (Over the past three years, resident rates rose from $483 to $511 to $541 to $573; non-resident rates from $704 to $746 to $790 to $837).

c. The revenue budget assumes enrollments of 24, 36, and 54 students (50% increases each year) over the three year period shown, with half the students in each year assumed to be out-of-state.

d. All revenue shown is attributed to CST, except in the second and third years, where one course per semester taken out of CST is assumed for each of the original 24 students (Year 2) and one course per semester out of CST for 36 students in Year 3. The non-CST revenue is backed out of the total CST revenue for each semester.

e. Estimates of Summer School revenue and expenses are included in the budget for years 2 and 3. Summer school revenue assumes that one half the students enrolled in the program for the previous academic year will enroll in an average of one summer school course per Summer Session. Summer school section scheduling will be tricky as student enrollment needs may vary considerably.

f. The figures shown in the following tables reflect only the revenue generated and expenses incurred by CST. We estimate that each MS IS&T student will average 2 electives (at 3 credit hours each) in other schools providing a total non-CST revenue in of almost $250,000 over the first three years of the program.

g. To avoid confusion, we have used the same tuition per credit hour in computing the income from non-CST courses as per CIS courses. We are aware that the FSBM and SHTM (School of Hospitality and Tourism Management) tuition is higher.

h. The non-compensation portion of the Expense budget includes rotational/replacement costs of
   - 10% of the cost of a new lab staff software specialist $ 6,000
   - Equipment (PCs, Printers, cartridges etc) $12,000
   - Operations (Telephone, supplies, voice over data connections etc) $ 5,000
   - Advertising $ 7,000
   - TOTAL $30,000

i. The Faculty Director’s salary is computed based upon an annual salary of $120,000.

j. The student assistant/consultant budget is computed based as follows:
   - One student per two sections for grading and software management
   - (10 hours per week x 14 weeks x $12 an hour = $1680 per student per semester)
   - 5.5 students per semester in first year; 7 students per semester in second and third years

k. Summer expenses are based on a per section instructional cost of $6,000 and $2,500 assistant/consultant budget.

The Revenue and Expense budgets are shown in Tables 5 and 6.
### Table 5: MS in IS&T REVENUE Budget for First Three Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollment</th>
<th>Fall CST Revenue</th>
<th>Spring CST Revenue</th>
<th>Summer I CST Revenue</th>
<th>Fall Other College Revenue</th>
<th>Spring Other College Revenue</th>
<th>Summer I Other College Revenue</th>
<th>TOTAL CST B+C</th>
<th>TOTAL TTL (Other Col D+E)</th>
<th>TOTAL COL F+G</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR 0: 2008-09</td>
<td>0</td>
<td>$65,473</td>
<td>$65,473</td>
<td>$10,912</td>
<td>$141,859</td>
<td>$207,218</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>YR 1: 2009-10</td>
<td>12</td>
<td>$161,112</td>
<td>$161,112</td>
<td>$26,852</td>
<td>$349,077</td>
<td>$349,077</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>YR 2: 2010-11</td>
<td>18</td>
<td>$198,866</td>
<td>$198,866</td>
<td>$42,614</td>
<td>$580,836</td>
<td>$580,836</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>YR 3: 2011-12</td>
<td>27</td>
<td>$315,601</td>
<td>$315,601</td>
<td>$57,105</td>
<td>$911,264</td>
<td>$911,264</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

GRAND TOTALS | $628,754 | $918,442 | $119,469 | $174,512 | $1,547,196 | $293,981 | $1,841,177 |

(*) CST revenue (Cols B & C) reflect loss of revenue from courses taken in other colleges (Cols D & E).
Table 6: MS in IS&T EXPENSES Budget for First Three Years

<table>
<thead>
<tr>
<th>Col</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full-Time Faculty (Crs Development)</td>
<td>Full-Time Faculty (Instruction)</td>
<td>Full-Time Faculty Director</td>
<td>Student Assistants/ Consultants</td>
<td>Other (Non-Compensation)</td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td>Average Base Salary per course estimated at $90,000/6 or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$15,000</td>
<td></td>
</tr>
<tr>
<td>Average Base Salary annual increase (percent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>YR 0: 2008-09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprng</td>
<td>$45,000</td>
<td></td>
<td>$20,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer I</td>
<td></td>
<td>$3,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr 0 Total</td>
<td>$45,000</td>
<td></td>
<td>$23,500</td>
<td></td>
<td>$30,000</td>
<td>$98,500</td>
<td></td>
</tr>
<tr>
<td>Yr 0 Total w 35% Fringe</td>
<td>$60,750</td>
<td></td>
<td>$31,725</td>
<td></td>
<td>$30,000</td>
<td>$122,475</td>
<td></td>
</tr>
<tr>
<td>YR 1: 2009-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>$30,600</td>
<td>$76,500</td>
<td>$40,800</td>
<td>$9,240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>$15,300</td>
<td>$91,800</td>
<td>$20,400</td>
<td>$9,240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer I</td>
<td>$6,120</td>
<td>$3,500</td>
<td>$2,410</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr 1 Total</td>
<td>$45,900</td>
<td>$174,420</td>
<td>$64,700</td>
<td>$20,890</td>
<td>$30,000</td>
<td>$335,910</td>
<td></td>
</tr>
<tr>
<td>Yr 1 Total w 35% Fringe</td>
<td>$61,965</td>
<td>$235,467</td>
<td>$87,345</td>
<td>$20,890</td>
<td>$30,000</td>
<td>$435,667</td>
<td></td>
</tr>
<tr>
<td>YR 2: 2010-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>$15,606</td>
<td>$109,243</td>
<td>$41,616</td>
<td>$11,760</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>$109,242</td>
<td>$20,803</td>
<td>$11,760</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer I</td>
<td>$6,242</td>
<td>$3,500</td>
<td>$2,940</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr 2 Total</td>
<td>$15,606</td>
<td>$230,969</td>
<td>$65,924</td>
<td>$26,460</td>
<td>$30,000</td>
<td>$368,959</td>
<td></td>
</tr>
<tr>
<td>Yr 2 Total w 35% Fringe</td>
<td>$21,068</td>
<td>$311,808</td>
<td>$88,997</td>
<td>$26,460</td>
<td>$30,000</td>
<td>$478,333</td>
<td></td>
</tr>
<tr>
<td>YR 3: 2011-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>$15,918</td>
<td>$111,427</td>
<td>$42,448</td>
<td>$11,760</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>$111,427</td>
<td>$21,224</td>
<td>$11,760</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer I</td>
<td>$6,367</td>
<td>$3,500</td>
<td>$2,940</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr 3 Total</td>
<td>$15,918</td>
<td>$235,538</td>
<td>$67,172</td>
<td>$26,460</td>
<td>$30,000</td>
<td>$375,139</td>
<td></td>
</tr>
<tr>
<td>Yr 3 Total w 35% Fringe</td>
<td>$21,489</td>
<td>$318,044</td>
<td>$90,683</td>
<td>$26,460</td>
<td>$30,000</td>
<td>$486,676</td>
<td></td>
</tr>
<tr>
<td>GRAND TOTALS</td>
<td>$165,273</td>
<td>$865,319</td>
<td>$298,750</td>
<td>$73,810</td>
<td>$120,000</td>
<td>$1,523,152</td>
<td></td>
</tr>
</tbody>
</table>
6. Comparison with other Programs and Program Differentiation

Given the demand forecast by the U.S. BLS presented in Section 2.1, it is not surprising that many universities offer some kind of Masters degree specializing in Information Science and Technology. Supply always follows demand. In formulating our own proposal, we reviewed the offerings in 22 programs offered by these universities. The schools were chosen based upon locality (in the Philadelphia area, or along the Washington to Boston corridor) and/or reputation in undergraduate or graduate IT education. We designed our program toward the strengths of theirs as well as to target a specific niche that we believe reflects the strength of our own department.

Many of these schools, Carnegie-Mellon, LaSalle, Northeastern, NYU, Pittsburgh, St. Joseph’s, Stevens Institute of Technology, University of Maryland, University of South Alabama, and Villanova, offer relevant curricula in more than one college. Others, such as Bentley College, Drexel, Hofstra, Penn State (three campuses), Rutgers, St. Scholastica (MN), West Chester, Widener, appear to offer a single program. Whatever the situation, our review served to illustrate what we already had expected: that there is a huge diversity of offerings, ranging from programs having a significant business focus, to those with a substantial engineering focus.

Nonetheless, we found several programs carefully targeted to students with backgrounds similar to our intended audience, in our case including undergraduate students majoring in IS&T or CS, from area colleges as well as Temple and employees or potential employees in the IT industry in the immediate Philadelphia area interested in furthering their IT education in a cost effective and convenient way. Of course, Drexel and Penn State Great Valley, both of whom have been in the graduate IT business for well over a decade offer robust programs in IS&T/IT. LaSalle and Villanova offer less robust programs, but are still clearly in a similar market. We believe that for cost and inner city location, as well as program quality, we are in a unique position to capture our intended audience, and reap other benefits for our department, college and for Temple University, that go beyond just our enrollment numbers.

6.1 MS in Management Information Systems (MIS) at the FSBM

Of special interest in our review is the MS in Management Information Systems at the Fox School of Business and Management. This program has a clear emphasis on business management/leadership, and less of a focus on technical issues (e.g., current hardware and software systems technologies) than the program we propose. The MIS program tracks provide areas of study including Accounting, Healthcare Information Systems Management, Human Resources Management Systems, and Operations Management.

Table 7 presents a listing of the programs examined, identifying their university, degree name and school or college. More specific comments on each program are presented, along with a link to their websites, in Attachment 1 of this document.
### Table 7: List of Masters Programs Examined

<table>
<thead>
<tr>
<th>Institution</th>
<th>Program</th>
<th>College or School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bentley College</td>
<td>MS in IT</td>
<td>School of Business</td>
</tr>
<tr>
<td>Carnegie Mellon University</td>
<td>MS in ISM (Information Systems Management)</td>
<td>Heinz School of Public Policy and Management</td>
</tr>
<tr>
<td></td>
<td>MS in IT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS in ISM (Information Security and Management)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS in SE (Software Engineering)</td>
<td></td>
</tr>
<tr>
<td>Drexel University</td>
<td>MS in IS (Information Systems)</td>
<td>College of Information Science and Technology</td>
</tr>
<tr>
<td>Hofstra University</td>
<td>MS in IT</td>
<td>School of Business</td>
</tr>
<tr>
<td>LaSalle University</td>
<td>MS in CIS</td>
<td>School of A&amp;S</td>
</tr>
<tr>
<td></td>
<td>MS in IT &amp; Leadership</td>
<td>School of Business</td>
</tr>
<tr>
<td>New Jersey Institute of Technology</td>
<td>MSIS</td>
<td>Courant Institute and School of Business (Joint)</td>
</tr>
<tr>
<td>New York University</td>
<td>MSIS</td>
<td></td>
</tr>
<tr>
<td>Northeastern University</td>
<td>MS in CS, Health Informatics and Information Assurance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS in Telecommunications Systems Management</td>
<td></td>
</tr>
<tr>
<td>Penn State University</td>
<td>MS IS&amp;T</td>
<td>School of Information Science and Technology</td>
</tr>
<tr>
<td></td>
<td>MSIS</td>
<td>School of Business</td>
</tr>
<tr>
<td>University of Pittsburgh</td>
<td>MSIS</td>
<td>School of Information Science and Technology</td>
</tr>
<tr>
<td>Rutgers</td>
<td>MS in Communication and Information Studies</td>
<td>School of Communication, Information and Library Sciences</td>
</tr>
<tr>
<td>Saint Joseph’s University</td>
<td>MS in CS (the actual courses overlap with our proposed program)</td>
<td>College of A&amp;S</td>
</tr>
<tr>
<td>Stevens Institute of Technology</td>
<td>MSIS</td>
<td>Howe School of Technology Management</td>
</tr>
<tr>
<td>Temple University (Fox School of</td>
<td>MS in MIS</td>
<td>School of Business</td>
</tr>
<tr>
<td>Business and Management)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Maryland</td>
<td>MSIS</td>
<td>Smith School of Business</td>
</tr>
<tr>
<td>University of South Alabama</td>
<td>MS in CIS</td>
<td>School of Computer and Information Sciences</td>
</tr>
<tr>
<td>Villanova</td>
<td>MS in Technology Management</td>
<td>School of Business</td>
</tr>
<tr>
<td></td>
<td>MS in SE (Software Engineering)</td>
<td></td>
</tr>
<tr>
<td>West Chester University</td>
<td>MS in CS, Computer Security, Information Systems, and Web Technology</td>
<td>College of Arts and Science</td>
</tr>
<tr>
<td></td>
<td>MBA program with a concentration in Technology and Electronic Commerce</td>
<td></td>
</tr>
<tr>
<td>Widener</td>
<td>MS in MIS</td>
<td>School of Business</td>
</tr>
</tbody>
</table>
6.2 Program Differentiation

The proposed program differs from nearly all of the programs in Table 7 in one important respect. We do not teach the traditional courses in database, networks and operating systems in our required Core set of courses. A student who enters our program with a degree in CS/IS&T has enough understanding of these subjects, so that we can dedicate all of our Core requirements to subjects in application software management and development processes, security, advanced enterprise management tools, and emerging technologies. We do provide graduate level course work, already existing in our current MS CS program, in database, networks and operating systems. Any student who wishes to make these a part of his/her program can do so as one or more of 5 electives.

This strategic decision is also largely supported by the BLS data shown in the Program Rationale of Section 1.2 above, regarding the types of computer professional jobs that will be in highest demand in the coming years.

Of course, students entering without a CS/IS&T degree must take or place out of the prerequisite courses, which are precisely these needed subjects in addition to programming. In other words, we view database, networks, operating systems and programming as the foundation of IS&T, and our Core can then focus entirely upon what is built upon this foundation. This concept sets us apart from most of the 22 programs reviewed in Section 6, including that of the MIS department of the Fox School of Business Management.

Another more unique aspect of this proposed program derives from the long history of our undergraduate CS and the more recent IS&T programs. We have throughout taught theory and methodology with an emphasis on application. This strength has been recognized by many students, especially those who wish the BS to be their terminal degree. Our advisors have had numerous requests from our own graduates for an MS that would continue in this approach. This faculty background and pedagogic approach, therefore, will inform the Core and many of the Electives that we will offer.

Finally, the program is not focused upon a single domain of application. Rather, the program encourages students through the 2 out-of-department Elective options and the Capstone project to devote this part of their time to a specific domain, that can be taken in any department of the University for which the prerequisites are satisfied. In particular, other programs in the CST include very large databases pertaining to their own domain knowledge, providing synergy between their own technologies and those of IS&T.

Another element of differentiation may be found in the two dual degrees discussed in Section 1.1, where, in the first case, a student can obtain both an undergraduate and the MS in IS&T in a 5 year program, and in the second case, can obtain both an MS in IS&T and a Ph.D. in another science.
References

1. Some source articles on the demand for skills to be provided by an MS in IS&T.

1. Job opportunities (nationwide) for CIS students: http://www.aftercollege.com/groups/listings.asp?id=1519892306
2. Information Week (April 2006) IT Employment Reaches Record Highs - An InformationWeek analysis of government labor data shows 3.472 million Americans employed in IT through the end of the first quarter.
3. Dr. Dobb's Portal (June, 2006) Forrester: Skills Shortage Will Worsen Unless Industry Seeds IT Talent - If systems integrators and customers don't become more proactive in seeding new IT talent, the shortage of skilled technical and sales personnel could become dire in the coming years, preliminary findings of a new study from Forrester Research show.
4. Information Week (October, 2006) IT Salaries Are On the Way Up - Business expansion and increasing investments in technology were the drivers behind the overall salary increases, analysts say.
5. Netscape Money & Business (November, 2006) – Average starting salaries for Computer Science graduates - now at $50,000, fourth highest in the nation behind chemical, electrical and mechanical engineers.
7. Philadelphia Inquirer (July 2006) – Fewer New Jobs Except in IT (Includes jobs in programming, network administration, technical support, and management.
8. Noteworthy Facts on CS and IT Jobs – From CIS Department Recruiting Information (Attached)
9. STEM Workforce Data Project: Report No. 7 (September, 2006) – a project of the Commission on Professionals in Science and Technology (CPST) in Washington, D.C. (contact Richard Ellis of Ellis Research Services in Carlisle , PA (raellis@earthlink.net) or Dr. Lisa Frehill, Executive Director of CPST (lfrehill@cpst.org).

2. The website for the Fox School of Business and Management’s MS in Management Information Systems can be found at http://sbm.temple.edu/ms-phd/ms-mis.html.
Attachment 1
Comparison with Other Programs

The need for a Masters degree specializing in Information Science and Technology has been recognized by numerous schools in the area. Examples of Colleges and Universities offering similar programs outside of a school of business and management include:

The need for a Masters degree specializing in Information Science and Technology has been recognized by numerous schools in the area, and nationwide. Reviews of the offerings in 22 of these universities (many of which offer relevant curricula in more than one college) illustrate a huge diversity of offerings, ranging from programs having a significant business focus, to those with a substantial engineering focus. More to the point, perhaps, several schools in the Philadelphia area offer programs which appear similar to our (at least from the point of view of course titles). A closer look at these programs (for example, at Drexel, LaSalle, and Villanova) will be required to ensure we are able to make a strong case for the distinctive nature of our program.

Examples of Colleges and Universities offering similar programs are shown below, in alphabetical order. Some of these programs are located in schools of business and some are not. The schools listed were selected based on a mix of reputation, early entry into the field of IT or IS&T or ISM, or locality (in the Philadelphia area). Program/School descriptions preceded by three asterisks (*** ) are considered to be our primary competition. Links to college websites for local, Philadelphia area schools are provided at the end of this document.

Bentley College– The MS in Information Technology Is offered through the College’s School of Business. The program prepares professionals for careers that require the integration of information systems knowledge with a strong understanding of the global business environment. Graduates often start to work as consultants, risk analysts, business analysts, systems analysts, project managers, or systems architects and advance quickly in technical and managerial careers. The program equips its graduates to work in and/or lead teams that analyze, architect, integrate and implement IT-based business solutions in an increasingly diverse, globally interdependent, and technically complex environment.

The program imparts current technical knowledge of the IS field as it is being shaped by IT-enabled business processes, distributed systems, communications networks, object-oriented analysis and development, and database technologies used in implementing state-of-the-art business solutions web technologies, distributed architectures, new infrastructure standards, and advances in mobile computing. The courses are very similar to ours, especially the Core, but they are much more focused on the business applications of IT than I expect ours to be. Students develop expertise in designing, deploying and managing the technology solutions that drive global, highly connected, real-time businesses. They use Java, JSP and J2EE for software development; UML for object-oriented modeling; Oracle and SQL for database management; Microsoft Project for IT project management; and networking labs and simulations.

Carnegie Mellon University – Programs of interest are offered in the Heinz School of Public Policy and Management. They include a Master of Science programs in Information Systems Management, Information Technology, Information Security and Management, and other Masters programs related to public policy and management. There is also a new program in Software Engineering Management. The MS programs in ISM and IT are most similar to the program we are proposing. The goals and courses share much in common with our own
program, although they are a bit more business focused than what we propose. The Master of Information Systems Management (MSISM) is a three-semester graduate degree program that integrates leading-edge IT practices with applied business methods. There is some overlap of this program with the one we propose, especially with their first semester program and our Core program. The Master of Science in Information Technology (MSIT) is a part-time graduate degree geared towards experienced IT professionals who are ready to advance their career in IT leadership while remaining in the workforce. Its integrated curriculum of technology and management coursework provides students with an understanding of information technology from both operational and strategic perspectives.

*** Drexel University – The Master of Science in Information Systems (MSIS) program offered in the College of Information Science and Technology (now known as the iSchool) is designed for information systems professionals who hold a bachelors degree and wish to pursue a Masters degree to broaden and formalize their knowledge about information systems and information technology. The curriculum incorporates a “principled approach” to the analysis, design, implementation, testing, deployment, assessment, and enhancement of large-scale information systems. Drexel has a huge inventory of courses which overlap with many of the courses we are proposing, and could well provide our most serious competition. We have a decided cost advantage over Drexel and can offer a more tightly scoped program with top quality professionals as instructors. [Drexel also has, within its College of Business, a Department of Decision Sciences, and a Department of Management offering programs in MIS, Strategy and Entrepreneurship and Organization Behavior, but these offer far less competition to our program.]

Hofstra University – Offers a Masters program in Information Technology out of the School of Business. The Master of Science Program provides qualified students who already hold baccalaureate degrees with a professional perspective and an opportunity to gain expertise in a specific field of business. These programs are targeted at those who seek to develop expanded bases of knowledge in a particular area of business, as well as those who may seek career change from one business discipline to another. Serve individuals with a strong commitment to managerial careers in business, government, or the not-for-profit sector who exhibit the potential for leadership in the global business community. These programs are less technically rigorous than what we propose and are far more business oriented.

*** LaSalle – LaSalle offers two programs related to our proposal: the MS in CIS offered by the CIS Department (in the School of Arts and Sciences), and MS in IT & Leadership offered by the School of AS and School of Business. The M.S. Computer Information Science (M.S. CIS) graduate program provides a technical study of the CIS field and is very similar to what we are proposing, even down to specific course offerings. Its curriculum addresses information distribution through personal computing, Internet computing, distributed environments, enterprise systems and n-tier architectures. Object-oriented and component-based programming, developed through the Unified Modeling Language, are the principal programming paradigms. These technologies and paradigms form the basis for current technologies such as Web programming, E-commerce and Enterprise Resource Planning (ERP) systems. The program emphasizes teamwork, interpersonal communication and presentations. A strength of the program is its practical focus, based on a strong conceptual foundation. Students may culminate their learning with a capstone project or research paper under the supervision of a faculty advisor. Some students partner with an external company, or work on a project associated with their employer as a project deliverable for that company.
The program includes the study of four major technology areas that are the building blocks for E-Commerce, Web programming and technologies, and Enterprise Resource Planning systems: 1) Software engineering -- systems life cycle, project management, leadership; 2) Databases -- n-tier, internet and intranet; 3) Systems and Developer -- object-oriented and component programming; 4) Networking -- concepts, installation and management.

**The Master of Science in Information Technology Leadership (M.S. ITL)**

The Master of Science in Information Technology Leadership (M.S., ITL) program, a new multi-disciplinary program in the School of Arts and Sciences and the School of Business, provides the foundation of information technology and the leadership skills needed for mid- to high-level information technology, systems managers, or information technology resource managers. There is ample evidence that for-profit and non-profit companies have a significant need for such leaders with the widespread use of information technology. Industry studies report that it is important for both the technical and the business sides to better understand each other's jobs and functions, especially as technical people assume project management roles. Core competencies include leadership, human resources, project management, communications, financial management, and technical competencies. The educational goals of this program include:

- Ensure basic skills in information technology and communication skills
- Provide a foundation in information technology and systems management
- Develop information technology competencies
- Develop leadership competencies
- Develop managerial competencies of information technology resources
- Provide a framework for keeping pace with the rapid advancements in technology
- Develop managerial and team skills through an integrative capstone experience

This program also shares some of the goals and courses we propose, and draws upon the strengths of both the School of Arts and Sciences and the School of Business. We have a decided cost advantage and are more accessible to Center City. We also should have a more prestigious faculty.

**New Jersey Institute of Technology** – The Master of Science in Information Systems program (MSIS – offered in the College of Computing Sciences, Information Systems Department) provides solid grounding in three principal areas: systems analysis and software engineering, information and communication technologies, management of information systems. The program emphasizes the planning, investigation, design, development, application, management and evaluation of Information Systems. The program trains students to be integral members of application design and development teams. It also provides exposure to the state-of-the-art in IS research, so that students will be prepared to work with both emerging concepts and technologies. The focus of the program appears to be very similar to ours, and many of the courses offered are similar at least in title, but the scope of offerings is somewhat larger.

**New York University** – NYU offers a Master of Science degrees in Computer Science and Scientific Computing (with Mathematics) in the Graduate School of Arts and Science (GSAS), and a Masters in Information Systems (MSIS) combining Computer Science at Courant and Business at Stern. The Master of Science in Information Systems (MSIS) program focuses on training students in the core concepts of computing and business so graduates can develop successful careers in management positions that require deep technical skills. This program is a
cross between our current MS degree and our proposed degree, and as such, provides not enough depth or variety in either. MSIS students draw from the same courses as Courant Computer Science graduate students (5 courses) and Stern MBA students (5 courses). There is a required project/capstone course and two electives are also required. The electives may be taken from either the CS or MBA programs. The MSIS program offers the academic equivalent of an abbreviated combined Computer Science Master's and MBA degree.

**Northeastern University** – The Graduate School of Computer and Information Sciences offers masters programs in Computer Science, Health Informatics, Information Assurance, and a Master of Science in Telecommunication Systems Management. The CS and IA programs share some common ground with our proposed program. The MS in CS program is extensive, and overlaps our proposed program in some areas, but also requires more of a theoretical background than found in our proposed program. The Graduate School of Business Administration and Professional Accounting also offers little that is similar to our proposal. The IA program draws on the expertise from the College of Computer and Information Science and the College of Criminal Justice, as well as the designation by NSA of the University as a Center of Excellence in Information Assurance Education. This interdisciplinary graduate program is designed to answer a critical shortfall of trained professionals in information assurance in the nation. It aims to enable an understanding of the technology and social context of information assurance. The program will address the need for management to possess a common sensitivity, understanding and competence in the foundation, issues as well as technology of information assurance. The disciplines from which students enter include computer science, criminal justice, engineering, mathematics and business administration. The Master of Science in Telecommunication Systems Management Program is designed for professionals currently in the telecommunications field who either wish to enhance their technical skills and credentials, or who wish to make a transition to the business side of telecommunications, especially to management or marketing. The disciplines from which students enter include engineering, computer science, the physical sciences, and mathematics. This program is one of only a very few master's programs in telecommunications in the United States that is truly multi-disciplinary. The degree of Master of Science in Telecommunication Systems Management is offered jointly by the Graduate School of Engineering and the Graduate School of Computer Science, in conjunction with the College of Business Administration.

**Penn State University (Main)** – The Master of Science in Information Sciences and Technology is an interdisciplinary degree program that focuses on the theoretical, application-oriented, and educational issues facing a digital, global economy. The program is designed to build an understanding of how information and technology fundamentally impact (and are impacted by) people, organizations, and the world community. Topical areas within IST span a broad range including: human computer interaction, computational techniques, applications (e.g., bio-informatics and geographical information systems), societal issues (such as digital divide issues), user issues (e.g., computer-aided cognition), and information systems design and development providing exposure and grounding in many of the aspects of the information sciences. The program is especially attractive to students interested in gaining state-of-the-art understanding of information technology and its use as a solution in multiple venues. The program offers very little in the way of software systems development, database systems, networking, or other more technically focused areas and is therefore quite different from our program.
Penn State University (Harrisburg) – Operating under the auspices of the School of Business Administration, Penn State Harrisburg's Master's degree program in Information Systems is designed to meet the rapidly increasing need for technically grounded, upper-level information resources managers within business organizations. The students served by the M.S.I.S. program primarily are part-time -- employees of area businesses, state and local governments, and not-for-profit organizations who study on a part-time basis. In order to accommodate both full- and part-time students, courses are primarily offered in the evening.

The two-fold nature of the program requires competence both in information technology and management theory. The curriculum combines the highly technical content of information science with the managerial emphasis of information systems. This program is organized around applied computer-based activities, the development of communication skills, and managerial principles. Students may elect to take one of two options in the program: Information Systems in Health Care Management and Delivery, or Information Systems in the Life Sciences. Each of these options requires a total of 36 credits. Alternatively, students can earn the degree without notation of an option; the total credits required for the degree under this choice are 30 credits. The program has a nice set of electives which, together with its required courses, yields a program similar to the one we are proposing.

*** Penn State University (Great Valley) – The Master of Science in Information Science (MSIS) is a computing and IT degree that addresses the challenges IT professionals face every day, from analyzing data to developing Web applications and managing IT staff and projects. The MSIS degree consists of 39 credits (13 courses). A 3-credit capstone course brings together the theoretical and practical experience you’ve gained in a seminar format. The program offers a balance of information systems and management courses, including course work in Network design Database development Web applications User interface design Enterprise solution design Forensic analysis of cyber-attacks. Most students are already employed in the IT field at corporations including Vanguard, Comcast, QVC, Wyeth Pharmaceuticals, PJM Interconnection, Certainteed, and SAP America. Graduates in MSIS have advanced in their careers to become managers of IT departments, technical consultants, business analysts, and project managers.

It would be difficult for us to compete with this program as it offers a rich set of courses that are targeted to the same audience as our proposed program. The program is organized around an 18-credit core curriculum (Software Development Lifecycle, Information Systems Architecture, Database Design Concepts, Behavioral Science in Business, Financial Accounting Theory and Reporting Problems) and 3 additional courses, including Communication Skills for Management, Statistical Analysis for Managerial Decision Making, and a required 3 credit capstone course.

After completing the 18-credit core curriculum, students select an elective track. The tracks organize courses into logical clusters but students are not restricted to following a particular track if they prefer to design their own curriculum provided they do not exceed the 9-credit limit of management electives. The tracks include Data Analytics, Technical Leadership, Trusted Computing, and Systems Architecture.

Pittsburgh – Pitt offers a Master of Science in Information Science offered by the Department of Information Science and Telecommunications (in the School of Information Sciences), and an MS in MIS offered by the School of Business. The Master of Science in Information Science (MSIS) degree program prepares students for careers as information professionals including systems analysts and designers, database developers and managers, information security experts
and more. This 36-credit program can be completed in three semesters (depending upon course schedules) of full-time study or as many as four years of part-time study. The School of Information Sciences offers four options to carefully target your studies. These tracks have been designed to give you the skills needed to excel in several leading edge fields: Database and Web Systems, Information Security, Geoinformatics, and Telecommunications and Distributed Systems. There is not a lot of overlap between the courses in this program and those in our proposed program.

Pittsburgh also offers programs in Library and Information Science, as well as an MS in MIS program, with a concentration in Information Systems. Both programs have an applications orientation. The latter program shares several core courses with what we have proposed, but even these courses have a definite business applications focus, including courses such as IS Planning, Project Management, Telecommunication Management, Business Systems Platforms, Knowledge Management Systems, Enterprise Networking, Database Management, Systems Analysis and Design, Open Source Technologies, Electronic Commerce Technology, Innovation, Adoption, and Diffusion, Structured and Object-Oriented Business Programming, Regulatory and Legal Issues in IS Management.

**Rutgers** – Offers a Master of Communication and Information Studies (M.C.I.S.) degree in the School of Communication, Information and Library Science. This program provides the knowledge and skills necessary to balance and understand the complex relationships among communication and information processes, technology, and human behavior. Emphasis is placed on developing the ability to critically evaluate results and anticipate unforeseen by-products of communication and information processes and technologies. The focus of this program is quite a bit different from ours.

***Saint Joseph’s University (PA)** – St. Joseph’s offers an M.S. Degree in Computer Science (in the Math and CS Department) with five concentrations: Web and Database Technologies, Software Engineering, Graphics and Visualization, System Security and Management and Information Sciences. This program offers a broader diversity of courses than our proposed program, and its Web and Database Technologies, Software Engineering, and System Security and Information Sciences Concentrations cover a number of the offerings that we would hope to achieve down the road. Even with the Web and Software Engineering components, however, there is little of the project management or web-based, e-commerce focus to be found in our program. The Core requirements are also far more theoretical (Design and Analysis of Algorithms, Theory of Computation, Computer Architecture) than what we propose. Overall, the St. Joseph’s program should be less appealing to the students we want to attract.

St Joseph’s also offers a Master of Science in Decision and System Sciences, billed as a Graduate Business Program in Computer Science and Information Technology. This program, offered in the school of business, has a more narrow focus than the proposed MS in IS&T, with core courses such as Contemporary Information Technologies; Developing Decision Making Competencies; Business Process and Transaction Analysis; Data, Information Models, and Business Tools.

**Saint Scholastica (MN)** – A first rate program built with minimal use of full-time faculty and extensive use of Adjuncts. For such a small school, it is a first rate, fairly well pruned program. It is a great model for others looking to start a new program with uncertain resources. The program intent and the course list match well the needs of a large segment of the practicing
community. This IT Leadership program prepares the student to implement advanced software systems and emphasizes the use of IT to address business issues as companies struggle to apply new technology in the workplace. Students gain a solid foundation based on both theory and real world application in order to understand emerging technologies. Graduates will be skilled at identifying and analyzing informational technology and organizational problems; creating innovative solutions; and making correct, ethical decisions at critical times.

**Stevens Institute of Technology** – There is a Master of Science in Information Systems offered in the Howe School of Technology Management. This program is designed for information systems professionals seeking to advance their careers in IT, for business professionals looking for ways to leverage their IT resources, and for academics that are preparing students for the challenges that await them. There are other Masters programs offered in the School of Systems and Enterprises, including Master of Engineering degrees in Systems Engineering (SE), Engineering Management (EM), and Enterprise Systems (ES) offered through a wide variety of delivery formats. Many of the courses in the MS in ES are the same as ours, at least in-so-far as titles go. The focus of and many of the courses listed in the MSIS are also very similar to ours.

*** Temple University – (Fox School of Business and Management) – The Fox School "Techno MS" in Management Information Systems develops IT professionals who can manage, lead, develop, and evaluate organizational information systems. Its mission is to prepare students for careers such as system analyst, project manager, and chief information officer (CIO). This program has a less of a focus on technology than the program we propose, and instead has a greater focus on business-oriented applications, but less on current hardware and software systems technologies. The MIS MS program’s tracks provide a good illustration of this with areas of study including Accounting, Healthcare Information Systems Management, Human Resources Management Systems, and Operations Management.

**University of Maryland** – The Smith School of Business offers programs in Decision & Information Technologies and Information Systems. Both have a very distinctive business/management flavor. The College of Information Studies offers a Master of Information Management (MIM) which meets the growing need organizations have for skilled information professionals who understand the issues of information management; business management; computer science; and information systems and who know how to strategically manage information and technology. The list of courses includes many that seem to be wholly intended for managers and leaders. This program differs considerably in focus from the one we propose.

**University of South Alabama** – The School of Computer and Information Sciences houses three departments, Computer Science, Information Systems, and Information Technology. These departments reflect the three areas of specialization in which students may chose to focus. The school offers Master of Science in Computer and Information Systems program designed for students and professionals wishing to gain advanced knowledge and expertise in computer science. There are two major areas of concentration within the degree program: Computer Science, and Information Systems. The Information Systems program centers on the development of systems that will improve the performance of people in organizations. The focus of this program is on the analysis of the evolving role of information and organizational processes. This includes the design, implementation and maintenance of the information systems that form the backbone of today’s global economy, and the integration of technology into
business. Graduates are expected to pursue professional careers as application developers, database analysts, business analysts, or managerial positions.

*** Villanova – Villanova graduate programs in the Department of Computer Science lead to Masters of Science (MS) degrees in Computer Science or in Software Engineering and/or certificates in specific computing areas. Other offerings include
- A 5-year BS/MS Integrated program
- Minors in Computer Science and Information Science.
- A Fluency in Information Technology certificate.
- A concentration or minor in Cognitive Science
- A major in Information Systems for adult learners
- Several courses for non-majors

There is also a School of Business MS in Technology Management (MTM). None of these programs is targeted to the same audience as our proposed IS&T program. The CS Masters program is a more conventional Masters similar to our existing MS in CIS. It not geared toward IS&T applications but more toward advanced instruction in computer science. Similarly, the Software Engineering Masters program offers a more conventional, specialized, SE curriculum, emphasizing software engineering practice and theory rather than a broader-based CS or IS&T curricula. The Technology Management program is very business focused and would not attract the same audience as our Proposed IS&T Masters.

West Chester University – The Department of Computer Science (College of Arts and Sciences) at West Chester offers an M.S. in Computer Science and certificates in Computer Science, Computer Security, Information Systems, and Web Technology. There is also an MBA program with a concentration in Technology and Electronic Commerce offered in the school of business. The M.S. in Computer Science is similar to our existing MS in CIS, providing a solid foundation in the fundamental principles of computer science and a sampling of electives allowing students to select an area of concentration in completing the degree. The electives include courses in database systems, computer security, and web technology. But aside from these individual courses, there appears to be no program similar to the proposed MS in IS&T.

Widener – Widener offers an MS in Information Systems (MIS) program. This program is designed to be a practical, applications-oriented degree covering state-of-the-art information systems technology and how that technology is integrated into the organization. The program is relevant to professionals in the field wishing to gain further knowledge and advance their careers. It is entirely business oriented.

Links to websites (and more details) for selected (local area) programs
1. Drexel
   The Master of Science in Information Systems (MSIS) (http://www.ischool.drexel.edu/CS/GraduatePrograms/MSIS/)
2. LaSalle
   MS in CIS (http://www.lasalle.edu/admiss/grad/comp/)
   Master of Science in Information Technology Leadership (http://www.lasalle.edu/admiss/grad/itl/)
3. Penn State (Main)
   Master of Science in Information Sciences and Technology (http://www.psu.edu/bulletins/whitebook/$programs.htm)
4. **Penn State (Great Valley)**

   [The Master of Science in Information Science](http://gv.psu.edu/PSGV_News_Events/PSGV_Programs/Information_Science/)

   (http://gv.psu.edu/PSGV_News_Events/PSGV_Programs/Information_Science/)
5. Saint Joseph’s (PA)
   M.S. Degree in Computer Science (http://macs.sju.edu/cscmsprog/index.html)
   Master of Science in Decision and System Sciences
   (http://sbm.temple.edu/ms-phd/ms-mis.html)

6. Temple University (FSBM)
   MS in Management Information Systems
   (http://sbm.temple.edu/ms-phd/ms-mis.html)

7. Villanova
   Masters of Science (MS) degrees in Computer Science or in Software Engineering
   (http://csc.villanova.edu/academics/graduatePrograms)
   Master of Science in Technology Management (MTM)
   (http://www.villanova.edu/business/graduate/mtm/)

8. West Chester University –
   M.S. in Computer Science (http://www.cs.wcupa.edu/root/)

9. Widener
   MIS
   (http://www3.widener.edu/Academics/School_of_Business_Administration/Graduate_Programs/Degree_Programs/MS_in_Information_Systems_Mgt_Info_Sys_/MSIS_MIS_Program/3197/)