Maryland Applied Information Technology Initiative

A Proposal for the Second Year of Operations

June 1999

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Double the production of IT professionals
Engage industry in curriculum design
Expand partnerships with industry
Facilitate the transformation of K-12 education as part of Maryland's K-16 Initiative

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EXECUTIVE SUMMARY

The information technology (IT) revolution now underway promises to dramatically alter virtually every aspect of the way human beings work, conduct business, and entertain themselves. The ultimate impact of this revolution will almost surely be as profound as that of the industrial revolution a century ago.

In recognition of IT’s preeminent role in transforming society, a highly competitive race has begun to attract both corporations whose mission is to develop, commercialize, and distribute IT, and those whose mission is to enable "users" and "consumers" to exploit the potential of IT for economic benefit. Every state wants to define its future by its leadership role in IT because of the universal presumption that IT is the key to a robust economy, a presumption firmly grounded in empirical evidence.

The State of Maryland has a unique opportunity to move significantly ahead of the competition by leveraging the intellectual IT resources of our nationally prominent research universities:

- University of Maryland, College Park
- Johns Hopkins University
- University of Maryland, Baltimore
- University of Maryland Baltimore County
- Towson University
- Morgan State University
- Bowie State University
- University of Maryland University College

and the outstanding IT programs at our comprehensive and doctoral institutions:

- University of Maryland, Baltimore County
- University of Baltimore
- University of Maryland Baltimore
- Johns Hopkins University
- University of Maryland, College Park
- Maryland Institute for Technology in the Arts
- Bowie State University
- Morgan State University
- Towson University
- University of Maryland University College

These Maryland institutions are working to build a stronger economy in Maryland.

This proposal is presented to continue and expand the seedling Maryland Applied Information Technology Initiative (MAITI). MAITI brings together a unique coalition of expertise in IT from eight universities, and ultimately plans to embrace all of higher education, the K-12 sector, state and local governments, and the IT industry.

Prompted by our complementary strengths and mutual interests in IT, and our recognition that a single entity can serve as a critical catalyst, MAITI has undertaken the following challenges:

1. providing state of the art training and education in IT;
2. increasing the number of graduates in all areas of IT to address the needs of Maryland IT companies;
3. making IT more accessible to government agencies to promote the efficient delivery of services, and to industry to develop new IT companies;
4. conducting IT research jointly with industry and government;
5. facilitating the use of IT to transform how and what K-12 students learn; and
6. working with state and local government agencies and the private sector to assure that Maryland’s information technology infrastructure remains nationally and internationally competitive.

By focusing on these specific goals, MAITI will address the critical challenges that affect Maryland’s ability to succeed and prosper in this rapidly developing IT economy. MAITI will catalyze Maryland’s leading research universities’ linkage of their IT research and training expertise directly to the promotion of economic growth in the state. MAITI will be inclusive of all those in the public and private sectors who can contribute to its mission.

Reflecting its primary emphasis on workforce development, MAITI is guided by a Board of Directors chaired by and composed primarily of prominent members of the private sector. Whereas MAITI’s first year of operations focused on organizing and coordinating the internal activities of the member institutions, its FY 00 emphasis will be on Statewide outreach, including coordination with the community colleges and K-12 institutions, collaboration with Maryland industry, and marketing its expanded IT offerings.

With overall program coordination provided by UMCP, MAITI will:

**Double the production of IT professionals**

- Double the number of students enrolled in and graduated from IT degree programs offered by the participating universities.
- Double the number of students enrolled in IT short courses and certificate programs.
- Significantly increase the number of degree and non-degree (certificate or credential) IT programs offered on campus, at off campus sites, or through distance learning.

**Engage industry in curriculum design**

- Create a regularized process for industry leaders to participate in IT curriculum design, especially the design of continuing IT education programs for professionals.

**Expand partnerships with industry**

- Provide IT expertise to Maryland companies through public-private partnerships and existing technology transfer mechanisms currently in place at the participating universities.
- Develop and implement flexible models for technology transfer and the commercialization of research products resulting from industry-university collaboration in IT.
- Expand current IT partnerships capitalizing on institutional expertise and industry resources.
- Facilitate the regular exchange of industry and university IT scientists and business executives.

**Facilitate the transformation of K-12 education as part of Maryland’s K-16 Initiative**

- Develop and implement training modules in IT to prepare K-12 teachers in Maryland to develop new technology-based education strategies and individualized learning opportunities.

While many of the key elements needed for the success of this new initiative are in place at the founding universities, FY00 funding from the State of Maryland is required to sustain progress towards these goals. MAITI will fund additional faculty at all participating institutions to address the critical IT workforce issue, and will provide coordination and marketing support to advance these goals. The ultimate goal of this initiative is to mesh the skills and capabilities of our research universities with the economic needs of the private and public sectors to leverage our collective resources in support of the State’s technology-based economy.

I. INFORMATION TECHNOLOGY

http://www.maiti.umd.edu
The information technology (IT) revolution is transforming virtually every aspect of society. Well into the 21st century, IT will be the central force in shaping almost every institution in society, including private sector companies, educational and cultural institutions, and government agencies. IT will transform the way human beings work, conduct business, and entertain themselves.

IT is pervasive in its impact because it can dramatically enhance an organization’s ability to obtain, share, and structure information; by so doing, it enables the organization to increase continually its base of knowledge, as well as to enhance its efficiency and competitiveness. Because of IT’s vast power to effect change, it has become a major growth industry, estimated at $800 billion per year worldwide and growing annually by 15%. Based on the universal presumption that IT is the key to a robust economy, every state, region, and nation seeks to define its future by its projected leadership role in IT.

With the rapid advancement of IT, the world economy is being transformed into an information economy. Just as capital and energy replaced land and labor some 200 years ago, the next 25 years will see the emergence of an information-driven society. The infusion of information and knowledge are now replacing capital and energy as the primary wealth-creating assets. Nowhere is this change more important than in its effect on the nature of human work. The laborers of the twenty-first century who deal with the transformation and utilization of physical resources are being replaced by knowledge workers—people skilled in interpreting and transforming information. The emerging information economy is growing two-and-a-half times as fast as the goods economy.

**IT Opportunities for Maryland**

A well-coordinated, IT-focused effort involving academia, industry and government, together with a modest investment by the State of Maryland to expand and leverage our complementary IT capabilities can energize the substantial resources of the State and direct them to provide major tangible economic benefits over the next five years. To do so, however, requires that our objectives are specific and focused, and that a single entity coordinates these particular efforts in a manner that is complementary to other coordinating entities (e.g., the various Technology Councils, the Maryland Technology Alliance). As such, we begin with a set of goals, many of which we share with other coordinating bodies.

Where MAITI differs is in the specific activities on which we propose to focus as a critical means of meeting these shared goals. We are uniquely situated to conduct these activities, and they are critically important to the State if it seeks to build and maintain its role as a leader in the IT economy.

A general level, the set of goals and objectives we share with other important entities includes:

1. developing the workforce necessary for an IT-based economy;
2. increasing the number of IT companies operating in Maryland.
   
   To this list, we add:
3. ensuring adequate numbers of well-trained graduates for an IT-based economy;
4. using IT to reduce the costs associated with the State’s provision of high-quality services and health care delivery;
5. providing consultation services in IT to promote new IT products and new IT corporations; and
6. increasing the number of K-12 teachers skilled in IT in order to facilitate the transformation of how and what students learn.

Success in this endeavor will:

7. enhance the competitiveness of Maryland IT businesses; and
8. increase the number of high-paying IT jobs in Maryland.

Before turning to the specific activities upon which MAITI proposes to focus during its second year, we elaborate briefly on the relationship between IT and the economy, and the key role that leading research universities play in maximizing the benefits of this connection.

The case for the nexus between economic gain and the ability to attract and retain IT industry is compelling. It derives generally from a recognition of the following:

- Industry and government agencies need many more highly trained IT professionals than are currently available. States with research universities with the recognized expertise to train sophisticated IT professionals in state-of-the-art technologies will be especially attractive sites for location and expansion of IT industry.
- Maryland is a major national center for IT expansion and growth, rivaling Silicon Valley in California and Rt. 128 in Massachusetts.
- Economic growth results from businesses re-engineering themselves through the application of the latest developments in IT. For example, the expanded use of electronic commerce, agile manufacturing, smart systems, and the application of IT to all aspects of business makes corporations more competitive in their respective markets. Close physical proximity between the nation’s leading computer science, engineering, business, medical and education programs, and IT-producing and IT-using corporations creates an environment highly conducive to industry-university-government IT research, the fruits of which will have great potential for corporate growth, which in turn stimulates a strong economy.
- The nation is on the cusp of remarkable developments in IT hardware, software, and delivery systems that will accelerate the degree of importance and acceptance of IT to industry, business, and commerce, and to everyday life. Many of these developments come from industry-university-government partnerships.
- For a variety of reasons, a large degree of the success of the United States in achieving world leadership in IT has been due to the strategic links that have been facilitated by the close physical proximity between nationally renowned research universities and the business and government agencies with whom they share a geographic location (e.g., Stanford University and Silicon Valley). The State of Maryland and the National Capital Region have a similar potential; the strong presence of IT-intensive government laboratories with a rich cadre of sophisticated IT scientists (e.g., NASA, NIH, NIST, NASA Goddard, DOD), leading private sector IT companies, and research universities with expertise in the academic disciplines central to IT (e.g., engineering, computer science, business) creates for Maryland a unique opportunity for capitalizing on and, indeed, leading the IT revolution.

The building blocks for creating synergies between our complementary needs and strengths are all in place. MAITI is the catalyzing agent needed to effectively focus these intellectual resource assets for economic gain.

**II. THE MARYLAND APPLIED INFORMATION TECHNOLOGY INITIATIVE (MAITI):**

The Maryland Applied Information Technology Initiative (MAITI) is an initiative designed to make Maryland a national center for information technology business development. Principal goals of MAITI include (1) doubling the number of information technology (IT) professionals enrolled and graduated by Maryland’s institutions of higher education to meet the needs of Maryland companies over five years and (2) strengthening IT research and development activities at Maryland’s higher education institutions to enable them to serve the R&D needs of existing Maryland IT companies and to attract new IT companies to the State. State funding for MAITI is focussed on the first goal, although the addition of faculty in IT areas will inevitably enhance the IT research and development capabilities at the participating institutions. The participating institutions will also aggressively seek private funding for this goal. Funding for the second goal is to be raised from federal, corporate, and private sources.

**Specific Focus:**

Prompted by our complementary strengths and mutual interests in IT, and our recognition that a single entity can serve as a critical catalyst, the following institutions have joined together through the Maryland Applied Information Technology Initiative (MAITI):

- University of Maryland, College Park (UMCP),
- Johns Hopkins University (JHU),
MAITI is an initiative dedicated to providing state-of-the-art training and education in IT, and to producing adequate numbers of graduates to support an IT-driven economy. Other long-term goals of MAITI include (1) making IT more accessible to government agencies to promote the efficient delivery of services, and to industry to develop new IT products to meet customer demands; (2) conducting IT research jointly with industry and government; (3) facilitating the use of IT to transform how and what K-12 students learn, and (4) working with State and local government agencies and the private sector to ensure that Maryland’s information technology infrastructure remains nationally and internationally competitive. By focusing on these specific goals, MAITI will address the critical challenges that will affect Maryland’s success and prosperity in this rapidly developing IT economy, and catalyze Maryland’s leading research universities to link their research and training expertise in IT directly to the promotion of economic growth in the state. MAITI began with UMCP, JHU, UMB, UMBC, Towson, Morgan State, and Bowie State, and has now added UMUC to its membership. Besides its leadership in providing IT-related programs for working adults and its international reputation in distance education, UMUC also brings with it close ties to many of the State’s community colleges. As an initiative dedicated to economic development, MAITI will seek to be inclusive of all those in the public and private sector who can contribute to its mission. Overall program coordination is provided by UMCP.

The Challenges

1. The first and foremost challenge for MAITI is to educate the numbers of talented people at all levels, especially undergraduate, needed to address the IT revolution, and to ensure that these people stay at the leading edge of a rapidly moving wave of technology.

This challenge is currently immense and is, in fact, a growing national challenge. As a result, there has been a significant exportation of IT-related work to other states and other nations. At a time when corporate downsizing restructured the economic foundations of the country, we can ill afford the loss of high-paying jobs to other states or nations.

Corporations in Maryland, as those nationwide, are clamoring to hire Bachelors, Masters, and Ph.D. graduates trained in state-of-the-art IT. Likewise, businesses and government agencies are frustrated by the inadequate supply of software engineers, network engineers, computer scientists, and IT experts with dual expertise in management, business, health, and education. In addition, businesses and government agencies are funding an increasing number of graduates who both understand IT and are educated in such public policy issues as economic forecasting, privacy, security and infrastructure protection, and regulatory policy. Over and above the urgency felt for “new hires,” there is an increasing demand for continuing education for this highly educated professional workforce. At a time when new technologies can transform a mode of doing business in a matter of months, IT education programs must be high quality, readily accessible, and rapidly redirected to accommodate new needs and new developments. MAITI will work with higher education institutions throughout the state to ensure that Maryland’s IT workforce needs are met. This effort remains the foremost priority of MAITI, and is the only effort for which State funding is requested in FY00.

2. Use the IT education and research capabilities of Maryland higher education institutions to support the goals of:

- the State to become a leader in IT (The Maryland Information Technology Master Plan);
- the Technology Councils (e.g., High Technology Council of Maryland, Greater Baltimore Technology Council) to attract and retain IT companies to Maryland, and
- IT companies in Maryland (e.g., Hughes Network Systems, Lockheed Martin, Bell Atlantic, Northrop Grumman, COMSAT) to become national and international IT leaders.

While much progress has been made, a great deal more can be accomplished. MAITI is complementary to the recently formed Maryland Technology Alliance; whereas the latter focuses on all aspects of technology and facilitates communication and a sharing of resources, MAITI is focused on providing education, training, and research collaboration in IT directly in response to corporate and governmental needs.

1. Accelerate commercial exploitation of information technologies that result from basic and applied research in universities and industry.

In the new information economy, those who can move new knowledge and technology most effectively and most rapidly into the marketplace will reap the greatest economic benefits. Similarly, those who can use new information technologies to efficiently transform their business and the services they deliver will derive substantial economic gains. Accelerating this process requires eliminating the gap between the traditional research environment, conducive to basic discoveries and progressors to commercial products, and the corporate research environment which must be responsive to the business and economic issues connected with the bringing of IT products quickly to market.

2. Help the K-12 school system in Maryland become a model for the effective use of IT in the development of new technology-based education strategies and individualized learning opportunities.

The State’s very commendable efforts to wire the schools were an important first step in bringing IT to these schools, but the greater challenges lie ahead. Discovering the most effective ways to use IT to help our students learn presents a large R&D task. Training teachers to apply these pedagogical tools and approaches is an even greater challenge.

Ensure that Maryland’s information technology infrastructure is sufficient to support the four challenges detailed above.

Because MAITI will include both a vigorous research and development program aimed at advancing the state-of-the-art in this crucially important area, and a strong corporate partnership program to ensure rapid transfer of new IT technologies to Maryland corporations and governmental agencies, MAITI will be able to provide ongoing input to State and local governments, as well as to the private sector, on how Maryland’s IT infrastructure can be modernized and upgraded to meet evolving needs.

III. MAITI PROGRESS IN FY 99

The first year of MAITI operations has been particularly encouraging. Performance goals have largely been met and, in some cases, exceeded. Undergraduate enrollments in IT degree programs are up 13 - 16% at research universities such as UMCP and UMBC, and have risen an astounding 36 - 38% at Bowie State and Towson University. In addition, Morgan State reported a 36% increase in undergraduate degrees awarded.

MAITI was initiated in July of 1998 with a $1,520,000 grant from the Maryland Higher Education Commission (MHEC). These startup funds were allocated to the initial seven participating institutions as follows:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMCP</td>
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</tr>
<tr>
<td>JHU</td>
<td>$203,000</td>
</tr>
<tr>
<td>UMBC</td>
<td>$220,000</td>
</tr>
<tr>
<td>UMB</td>
<td>$57,000</td>
</tr>
<tr>
<td>Towson</td>
<td>$90,000</td>
</tr>
<tr>
<td>Morgan State</td>
<td>$90,000</td>
</tr>
<tr>
<td>Bowie State</td>
<td>$90,000</td>
</tr>
<tr>
<td>Total</td>
<td>$1,520,000</td>
</tr>
</tbody>
</table>

Table 1. Distribution of FY 99 Startup Funds
The initial Increment of grant funds was received December 31, 1999, and progress in FY 99 proceeded close to the plan of deliverables. Specific accomplishments included:

1. Execution of the FY 99 grant agreement with MHEC.
2. Execution of a Memorandum of Agreement (MOA) with each of the participating institutions, MHEC, and DBED, signed by the chief executive officer of each organization.
3. Formation of the MAITI Board of Directors (a list of members is enclosed as an appendix).
4. Formation of a working group of MAITI co-directors representing each participating institution.
5. Hiring of additional faculty.
6. Enrollment of additional IT students.
7. Hiring of a full-time director.

Each of the participating institutions has also launched efforts to leverage State funding for MAITI with funds from corporate, federal, and private sources. Early examples include:

1. Dr. Jeong Kim, a member of the MAITI Board of Directors, has pledged $5M in support for faculty chairs for scholarships in the IT area at UMCP.
2. UMCP has secured an appropriation in the FY99 NASA budget of $2M to improve the University’s IT infrastructure and enable the University to support the federal government’s research objectives in the IT area.
3. UMCP has secured a pledge of $400,000 from BGE to support the construction of a BGE Learning Center to provide additional IT-capable classroom space for engineering and computer science students.
4. Lockheed Martin has pledged $1,000,000 over the next four years in support of MAITI objectives at all participating institutions, including funds for scholarships and two computer classrooms at UMCP.
5. UMBC has received a pledge of a $1M chair in IT from another donor, along with a second pledge of $100,000 per year for ten years in support of IT initiatives.
6. Bowie State has obtained over $3M in federal support for IT education and research initiatives from NASA and NSF.
7. The Robert W. Deutsch Foundation has pledged $150,000 over the next three years to Towson University (Robert Deutsch is a member of the MAITI Board of Directors).
8. Barbara Perrier-Dreyer has pledged $100,000 over the next 5 years to Towson University (Barbara Perrier-Dreyer is a member of the MAITI Board of Directors).
9. The Alonso and Virginia Decker Scholarship Fund has contributed $50,000 to the undergraduate scholarships in IT at JHU.

IV. MAITI ACTIVITIES AND AREAS OF FOCUS IN FY 00

FY 00 offers the opportunity to sustain the early enthusiasm for MAITI, to increase the momentum built up in FY 99, and to put increased focus on the engagement of Maryland industry in the design of instructional programs. The universities have benefited from significant increases in State funding, and even though the State's FY00 funding for MAITI falls short of aspirations, our expectations remain high, particularly considering the accomplishments of FY 99. MAITI has attracted early and significant support from Maryland industry. Nonetheless, State funding provides the foundation and sustained support required for expansion of University programs. The national workforce issues have become so severe, that even when fully funded, universities across the nation are reporting difficulty attracting faculty due to the intensely competitive job market. This is precisely the long-term problem MAITI is addressing, and the one behind which industry is particularly enthusiastic.

Workforce Development

As stated in the original MAITI proposal, it remains the case that across the nation, there is a desperate call for more IT professionals. A 1998 survey in the state of Washington found, "Projected demand for information technology program graduates outstrips locally educated supply by a factor of at least four at the community and technical colleges . . . by a factor of over eight for bachelor's-level graduates at the public and private 4-year colleges and universities, and by a factor of two for graduate-level programs."

Maryland already has a national reputation for being a leader in IT workforce development. Even so, within Maryland there remains a great unmet demand for employees trained in the full spectrum of information technologies. Current estimates in the State range from 10,000 to 20,000 unfilled IT positions (USM Report; Baltimore Sun, 2/1/98; Daily Record, 3/8/99). The Baltimore Sun Paper reported that Maryland has a severe shortage of qualified technology professionals and companies are robbing one another for high tech workers. Demand is especially high for software developers, Internet programmers, and network specialists. The shortage is having a profound effect on the economy. According to the Washington Post (3/30/97), every 25,000 unfilled technology jobs costs the region between $1 and $2 billion per year in lost wages.

In addition to the need for "new hires," there is a strong demand for sophisticated IT education and training for the workforce in place, and for professionals who are concerned with acquiring and keeping their IT skills current. To address these immediate short-term needs, MAITI will continue its focus on developing education and training programs for students at the Bachelor's, Master's, and doctoral levels in IT, and on creating a rich menu of course offerings, in degree and non-degree programs, offered on and off campus, directly responsive to specifically identified corporate needs.

1. Double the Number of Students

MAITI's primary objective is to double the number of students enrolled in and graduated from IT degree programs by the year 2003. MAITI also aims to double the number of students enrolled in IT short courses and certificate programs over the same period.

Baseline enrollment and degree data to be used in assessing progress toward this goal is included in Section V. In FY 98, the baseline year, our seven universities (UMUC excluded) awarded approximately 900 B.S. and 750 graduate degrees (mostly Masters degrees) in IT fields of study. Under the auspices of MAITI, we committed to doubling IT program enrollments and graduates by the year 2003. Part of the increase will result from new programs coming on-line, e.g.,

- computer engineering majors at Johns Hopkins, UMCP, and UMBC,
- an IT elective concentration in mechanical engineering at College Park, and
- a new Information Systems undergraduate program, an expansion of the Information and Telecommunications masters program at JHU
- a new B.S. program in Computer Technology at BSU
- a large number of new undergraduate and post graduate certificate programs at each institution
- a new undergraduate specialization in Computer Information Technology (CIMIT) at UMUC
- establishment of the new Center for Applied Information Technology at TU

Increases in IT graduates will also come from increased enrollments in computer science, the decision and information sciences major in business, and engineering, each prompted by the increased interest, excitement, and resources brought about by the existence of MAITI. The remaining increases will come from specialized programs such as nursing informatics and telemedicine. MAITI will also work with other higher education institutions with significant IT programs and with the community colleges to achieve a similar growth in IT graduates from those sources.

2. Teaching in Partnership with the Private Sector

While most universities have embraced interdisciplinary courses, there remains a lag between the multidisciplinary team approach common to industrial research and the corporate emphasis on economic efficiency and quick responses, and the model of research and business assumed in our classrooms. To address this lag, MAITI proposes several initiatives:

Cooperative Curriculum Design will be a primary goal of MAITI, so that IT degree programs, non-degree programs, certificate programs and credential programs are designed with the specific input of corporate professionals working jointly with faculty. In addition, MAITI will accept proposals for continuing IT education, to be offered at corporate sites, on campus or through distance learning; distance learning will build on the historic strengths and excellence of the partner institutions, including the global reach of our newest partner, the University of Maryland University College. MAITI envisages a corporation submitting a statement of its IT education and training needs to MAITI with a budget and a set of temporal and other parameters, MAITI would respond by putting together an educational package itself, or one developed in conjunction with other private and public sector education institutions in the State. In some cases, specialized laboratories will be established with the latest commercially applicable technologies in which our faculty can train other professionals on the application of state-of-the-art IT systems.

Capstone Courses are being designed as part of MAITI for undergraduate seniors to bring their formal educational experience closer to their likely future professional experience. JHU has also introduced capstone courses into the masters program in Information and Telecommunications Systems. Real world IT problems are derived from industrial sources and assigned to students teams for development and assessment of IT design methodologies, IT feasibility, and consideration of economic and reliability factors associated with the search for a solution to the IT problem. MAITI will concurrently develop a course for students and faculty to emphasize strategies of IT problem solving, IT project management, and the development of effective multidisciplinary IT teams.

IT Internships at the undergraduate and Masters level will be designed to provide corporations with the opportunity to recruit the most talented IT students to work at the corporate...
A Professor of Practice program will be established to recruit business and technology leaders to campus for extended visits; the purpose of these visits will be to facilitate closer working relationships in IT between industry and our universities. The model for these Professors of Practice is the clinical professor of medicine or law, who comes to campus for an extended visit, during which time he/she may direct IT faculty-student research teams, teach specialized seminars, or work with faculty to bring industry insights to IT curriculum development. One goal of this program will be to involve industry IT experts in team-teaching of IT courses to ensure that our IT offerings are both current and relevant to corporate needs.

**Courses and Programs in IT**

- the M.S. in Telecommunications at UMCP,
- the M.S. in Information Systems and Telecommunications, and a B.S. in Information Systems at Johns Hopkins,
- the planned MBA concentration in Management of Technology, and the Decision and Information Sciences Program, both at UMCP's School of Business,
- the IT-focused Joint UMCP/UMI program in bioengineering,
- UMUC's fully online masters programs in Telecommunications and Software Engineering, and
- UMUC's undergraduate programs in CMIS, CMIT, and ISM.

**Continuing Education** will be a high priority for MAITI, given the rapidly expanding, continuing education needs of industry, both with respect to the nature of the courses offered and their format. MAITI will work to develop a full spectrum of new courses including hands-on tools-oriented courses for programmers and engineers, for professionals in health care and education, for executive-level IT education, and for technology managers. These courses will be offered by university faculty and outside experts on a pay-for-services basis. MAITI will facilitate the delivery of continuing IT education to industry. Johns Hopkins has already successfully offered over 200 short-courses and part-time courses in IT related areas; UMUC has a long tradition and, in fact, mission of delivering innovative options for continuing education, including customized courses for employers in the region; and UMBC delivers about 50 courses and has been offering extensive training programs in IT, through the Office of Academic Computing Services, for international participants who are potential business partners for Maryland companies. UMB utilizes IT in its professional training programs, as well as in the provision of rapid assistance to those in need of its expertise across the State, the nation, and internationally; UMBC has significant IT short-course offerings as well. MAITI will build on these strong foundations to tailor continuing education more fully to corporate needs.

**V. SPECIFIC TARGETS AND DELIVERABLES**

The FY00 program for achieving MAITI's second year goals is summarized below. All goals have been set such that MHEC and DBED will be able to evaluate MAITI progress before an FY01 budget request must be approved.

**IT Enrollment and Graduation Targets**

In order to provide appropriate baseline information to be used for setting target enrollments in IT programs at the participating universities, a comprehensive survey was conducted of IT degree production, total program enrollments, and first year enrollments at the seven founding institutions (UMCP, JHU, UMBC, UMB, BSU, MSU, and TU) for the 1997 and 1998 academic years. In this survey we have included only core IT programs whose graduates are in significant demand by Maryland industry. These data are enclosed in the Appendix. Using this information, two-year averages for IT degree production, total program enrollment, and first year enrollment have been calculated for each institution, as shown in the table below. This data will be used as the baseline data against which progress in meeting MAITI targets for additional workforce generation will be judged.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Total UG Enrollment</th>
<th>Total Grad Degrees</th>
<th>Total 1st yr UG Enrollment</th>
<th>Total 1st yr Grad Degrees</th>
<th>Total 1st yr Degrees</th>
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<td>UMB</td>
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<td>Towson</td>
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<td>Morgan</td>
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<td>Bowie</td>
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<td>28</td>
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</tr>
<tr>
<td>Total:</td>
<td>5733</td>
<td>6304</td>
<td>991</td>
<td>1315</td>
<td>855</td>
</tr>
<tr>
<td>UMUC</td>
<td>2455</td>
<td>1676</td>
<td>510</td>
<td>571</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Baseline Enrollment Data (see Appendix 2 for constituent programs)**

- UMUC joined after the following tables of enrollment targets were established.

In enrollment targets are currently under development.

Based on these baseline data, the participating universities initially set the following targets for total and first year enrollments, and undergraduate and graduate degree production in IT programs for the period FY99-03 as shown below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total UG Enrollment</th>
<th>Total Grad Degrees</th>
<th>Total 1st yr UG Enrollment</th>
<th>Total 1st yr Grad Degrees</th>
<th>Total 1st yr Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY99</td>
<td>5900</td>
<td>6400</td>
<td>1000</td>
<td>1400</td>
<td>2400</td>
</tr>
<tr>
<td>FY00</td>
<td>6300</td>
<td>6100</td>
<td>1150</td>
<td>1600</td>
<td>2750</td>
</tr>
<tr>
<td>FY01</td>
<td>7800</td>
<td>9500</td>
<td>1400</td>
<td>1800</td>
<td>3200</td>
</tr>
<tr>
<td>FY02</td>
<td>9400</td>
<td>11000</td>
<td>1700</td>
<td>2100</td>
<td>3800</td>
</tr>
<tr>
<td>FY03</td>
<td>11500</td>
<td>12600</td>
<td>2000</td>
<td>2600</td>
<td>4600</td>
</tr>
</tbody>
</table>

**Table 3. Initially-proposed Enrollment Goals**

These goals have been adjusted based on the combination of accelerated first year progress and reduced funding availability in FY00, anticipating restoration of full funding in FY01, as shown below:

http://www.maity.ini/maity/
These revised targets assume that MAITI funding will be continued and augmented in an appropriate manner each year following progress evaluations by MHEC and DBED. It remains essential that all involved understand that the participating universities cannot markedly increase enrollments in these areas unless State support is provided on a continuing basis. A termination or diminution of State support at any time would leave the participating universities in a situation of having substantially increased enrollments without the resources necessary to support them. The participating universities also view it as vital that MAITI’s funding evolve from grant funding to the Universities’ budget appropriations, as the long term faculty hiring commitments required to ensure success cannot be made by university departments on the basis of unstable grant funding.

Establishing baseline figures for IT short course and certificate enrollments is an ongoing, but much more difficult task since the community colleges and other UM System institutions play a significant role in this area. One of the deliverables originally scheduled for FY99, but now delayed until FY00, is a survey of all relevant institutions to establish meaningful baseline data in this area.

Other Deliverables

1. Development of an Accountability System for Ensuring that MAITI Goals are Met

During the first two months of FY00, the Director and the Board of Directors of MAITI will prepare an accountability plan to measure progress toward specific MAITI goals. This plan will be submitted to MHEC and DBED for approval, and will include agreed-upon measures for monitoring progress in the following areas (in priority order):

a) IT degree program enrollments and graduates.

b) IT short course development, offerings, and enrollments. As discussed above, this will require a comprehensive survey of existing offerings across the State to establish meaningful benchmarks in this area.

c) Industry/government participation in IT educational programs at the participating universities.

d) The number of IT program graduates placed in Maryland IT companies, service industries requiring IT support, and governmental organizations.

e) Industry/government sponsored IT research at the participating universities.

f) MAITI IT marketing and retention efforts.

This plan will be submitted to DBED and MHEC for approval by August 30, 1999.

2. Updated 5-Year Plan for MAITI Including Plans for Inclusion of Other Higher Education Institutions in Maryland

The participating universities, working with DBED and MHEC, published a 5 year plan in November 1998 for MAITI, including program plans, deliverables, budget requirements, and plans for the inclusion of other higher education institutions including the community colleges. These planning efforts were inclusive, with the active participation of potential partners in the planning process. This plan will be reviewed and updated during FY00 and submitted to DBED and MHEC for approval by March 31, 2000.

3. Establishment of MAITI on the World Wide Web

MAITI’s operations to date have largely been conducted in a distributed manner through the member institutions’ academic departments. This is the intellectual foundation of MAITI, and the one from which we will grow. During MAITI’s second year of operation, this foundation will be extended to include a substantial Web presence to support outreach to students, faculty, sponsors, State government, Maryland industry, and related parties. An initial Web site identified as www.maiti.org is scheduled to be in operation by August 30.
without the resources necessary to support them. It is also vital that MAITI's funding evolve into the Universities' budget appropriations, as the long term faculty hiring commitments required to ensure success cannot be made by university departments on the basis of unstable grant funding.

Budget for Income

Funding for MAITI is expected to come from the State of Maryland, business and industry, federal and local government, and the higher educational institutions. State funds will eventually be needed to initiate activity in each of the focus areas, but the funds provided by the State in FY 00 will be entirely directed at workforce development. Due to the delayed initiation of funding in FY 99, we proposed shifting $660,000 of the FY 99 grant of $1,32M to FY 00. The deliverables schedule has been revised to reflect this change. This provides a total State funding of $1,98M for FY 00. The expected sources of MAITI income for FY00 are shown below:

<table>
<thead>
<tr>
<th>Source</th>
<th>FY 99 Income</th>
<th>FY 00 Income</th>
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<tbody>
<tr>
<td>State Funds</td>
<td>$660,000</td>
<td>$1,980,000*</td>
</tr>
<tr>
<td>Participating Universities</td>
<td>$750,000</td>
<td>$750,000</td>
</tr>
<tr>
<td>Corporate Support</td>
<td>$250,000</td>
<td>$750,000</td>
</tr>
<tr>
<td>Federal Support</td>
<td>$750,000</td>
<td>$750,000</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$2,410,000</strong></td>
<td><strong>$4,230,000</strong></td>
</tr>
</tbody>
</table>

Table 5. Budget for Income

* FY 00 Income includes $660,000 of unspent FY 99 funds carried forward.

Budget for Expenses

If the performance of MAITI in its initial years justifies additional state support, we propose that an appropriate figure would be for it to grow to a state-supported budget of $10M that would be used to leverage an additional $20M from business and industry, federal funding, local government, and the participating higher educational institutions. At such a level MAITI would be a nationally recognized force in information technology, with an accompanying impact on the citizens of the state and its economy equal to many times this amount.

Business, industry and federal government support comes from research and development projects, and from training courses taken by their personnel. Business support will also be obtained for the support of Professors-in-Practice and for the development of joint laboratories.

Support from the higher education institutions will chiefly be the costs of administrators and faculty dedicated to MAITI activities, costs of financial aid provided to program participants, and the costs of establishing administrative offices and computer labs.

Overall MAITI budget expenditures from all sources for FY00 are projected to be spent in three principal areas as shown in the table below:

<table>
<thead>
<tr>
<th></th>
<th>State</th>
<th>Universities</th>
<th>Corporate</th>
<th>Federal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce Development</td>
<td>$1,830,000</td>
<td>$700,000</td>
<td>$350,000</td>
<td></td>
</tr>
<tr>
<td>Research and Development</td>
<td></td>
<td>$400,000</td>
<td>$750,000</td>
<td></td>
</tr>
<tr>
<td>MAITI Administration</td>
<td>$150,000</td>
<td>$50,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$1,980,000</strong>*</td>
<td><strong>$750,000</strong></td>
<td><strong>$750,000</strong></td>
<td><strong>$750,000</strong></td>
</tr>
</tbody>
</table>

Table 6. Budget for Expenses

* $660,000 of State funding is carried forward from FY 99 to cover FY 00 expenses.

Campus Planned Budget Allocations

The FY00 budget for the allocation of State funds to the participating universities is shown below.
Table 7. FY 00 State Budget Allocation by University

<table>
<thead>
<tr>
<th>Institution</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Maryland, Administration, Outreach and Marketing</td>
<td>$155,000</td>
</tr>
<tr>
<td>UMCP</td>
<td>$625,296</td>
</tr>
<tr>
<td>JHU</td>
<td>$326,419</td>
</tr>
<tr>
<td>UMBC</td>
<td>$347,415</td>
</tr>
<tr>
<td>UMB</td>
<td>$78,482</td>
</tr>
<tr>
<td>Towson</td>
<td>$169,955</td>
</tr>
<tr>
<td>Morgan State</td>
<td>$182,451</td>
</tr>
<tr>
<td>Bowie State</td>
<td>$94,982</td>
</tr>
<tr>
<td>Subtotal</td>
<td>$1,980,000</td>
</tr>
<tr>
<td>UMUC</td>
<td>$120,000</td>
</tr>
<tr>
<td>Community Colleges</td>
<td>$100,000</td>
</tr>
<tr>
<td>Total</td>
<td>$2,200,000</td>
</tr>
</tbody>
</table>

Notes:
1. Budget allocations are for planning purposes and subject to revision based on refinement of specific campus programs.
2. UMUC budget allocation is a deficiency budget request.
3. Community College allocation is a deficiency budget request.

Additional notes on FY00 Budget Expenditures: The following provides additional detail on how each institution proposes to spend its FY00 State funding allocation in support of the workforce development program. All State funds except those for MAITI administration will be used directly to increase the enrollment capabilities of the participating universities in core IT programs. The following allocations are estimates based on enrollment targets for FY00 contained in Section V.

- **MAITI Program Office Administration**, Outreach and Marketing - $155K
- **UMCP**
  - Full-time Faculty - $230K
  - Part-time Faculty - $200K
  - Teaching Assistants - $200K
- **JHU**
  - Whiting School Part-time Faculty - $150K
  - School for Professional Studies in Business and Education (SPSBE)
  - IT Laboratory and Part-time Faculty - $176K
- **UMBC**
  - Full-time and Part-time Faculty - $250K
  - Teaching Assistants - $97K
- **UMB**
  - Full-time Faculty and Teaching Assistants - $78K
- **Towson**
  - Full-time Faculty and Teaching Assistants - $170K
- **Morgan State**
  - Full-time Faculty - $80K
  - Part-time Faculty - $102K
- **Bowie State**
  - Full-time Faculty and Teaching Assistants - $95K
- **UMUC**
  - Professors of Practice - $30K
  - Part-time Faculty - $50K
  - Online Curriculum Development - $40K
- **Community Colleges** Competitively awarded based on proposals received

Payout Schedule:

FY 00 State funding for MAITI will be provided to UMCP for distribution to all participating institutions according to the allocation schedule shown above. This funding will be paid out according to the following schedule:
<table>
<thead>
<tr>
<th>Deliverables</th>
<th>FY09 Funds</th>
<th>FY10 Funds</th>
<th>Projected Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Establish Industrial Relationship</td>
<td>1/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. UMUC MOA for MAITI participation</td>
<td>1/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Report on FY08 IT degree program enrollments and graduates</td>
<td>1/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Report on FY08 IT degree program enrollments and graduates</td>
<td>7/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. New Institutional Member Overview</td>
<td>4/1/09</td>
<td></td>
<td></td>
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<tr>
<td>6. New Institutional Member Checklist</td>
<td>4/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Status report on FY08 IT degree program enrollments and graduates</td>
<td>6/1/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Status report on FY08 IT degree program enrollments and graduates</td>
<td>8/24/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Outreach Plan</td>
<td>8/24/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Status report on FY08 IT degree program enrollments and graduates</td>
<td>8/24/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Board Meeting</td>
<td>8/24/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Board Meeting</td>
<td>8/24/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Outreach Plan</td>
<td>9/22/09</td>
<td></td>
<td></td>
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<tr>
<td>14. Establish corporate sponsorship tier</td>
<td>9/22/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Professor of Practice program</td>
<td>11/30/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Status report on FY08 IT degree program enrollments and graduates</td>
<td>11/30/09</td>
<td></td>
<td></td>
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<tr>
<td>17. Integration of IT into national programs</td>
<td>12/12/09</td>
<td></td>
<td></td>
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<tr>
<td>18. Fall Enrollment Report</td>
<td>1/14/09</td>
<td></td>
<td></td>
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<tr>
<td>19. Fall Enrollment Report</td>
<td>1/14/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Fall Enrollment Report</td>
<td>1/14/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Marketing Plan</td>
<td>1/14/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Preliminary plan for cooperative curriculum design</td>
<td>1/14/09</td>
<td></td>
<td></td>
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<tr>
<td>23. Board Meeting</td>
<td>3/20/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Product Marketing Materials</td>
<td>3/20/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Revised statewide 5 Year Plan</td>
<td>3/11/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Revised statewide 5 Year Plan</td>
<td>3/11/09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Year End Accountability Report Including Some Current Plan Totals</td>
<td>4/30/09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- UMUC joined MAITI towards the end of FY09 with no FY 00 funding; this M O A is to establish the relationship between MAITI and UMUC, a deficiency funding request of $120,000 is pending.
- The initial MAITI proposal did not consider chasses of courses for extending MAITI membership to other institutions, such as the Community Colleges: This policy will address level of participation, obligations of membership, and strategies for funding. A deficiency budget request of $100,000 for Community Colleges to date is pending.
- The Accountability Plan, not fully developed in FY09, is to include measures for monitoring progress in (a) IT degree program enrollment and graduates, (b) IT short courses development, offerings, and enrollment, (c) industry-governor supports at universities, (d) number of IT programs graduates placed in Maryland IT companies, and (e) faculty research grants. A deficiency budget request of $50,000 for OAMC is pending.
- The Outreach Plan, not fully developed in FY09, is to include measures for developing synergistic non-financial relationships with organizations and institutions which are critically important to the success of MAITI goals, such as K-12 institutions who are the source for undergraduate enrollment.
- The Marketing Plan focuses specifically on strategies for developing financial support from corporate, foundation, and federal sources.

APPENDIX 1. MAITI Boards and Committees

Board of Directors

Barry G. Campbell (Chairman), Chairman and CEO, Tracor Systems Technologies

Barbara Perrier-Dreyer, President, Greater Baltimore High Technology Council, Vice President and Chief Financial Officer, Communications Systems Technology

Terry Drabant, President, Lockheed Martin Mission Systems

Michael S. Gering, President, Litton, Amecom

Sue Gomez, Senior Manager of Quality Services, Allied Signal Technical Services

Ram Makunda, President and CEO, Startec Worldwide Communications

Dan Fraley, Senior Vice President for Engineering, Hughes Network Systems

John Evans, Vice President and Chief Technical Officer, COMSAT

Robert Deutsch, President and CEO, RWD Industries

Joong Kim, Corporate Vice President and General Manager, Northrop Grumman Corporation

Emmett Paige, President, OAO Corporation

James Roche, Corporate Vice President and General Manager, Northrop Grumman Corporation

Charles Wellford, Interim Associate Provost, UMCP
William W. Destler, Associate Provost for Research and Dean of the Graduate School, UMCP
Eugene DeLoatch, Dean of Engineering, Morgan State University
Joann Boughman, Vice President for Academic Affairs and Provost, UMB
John Pinkston, Chair of Computer Science and Electrical Engineering, UMBC
Mark Greenberg, Acting Dean, College of Extended Programs, Towson University
Sadanand Srivastava, Chair of Computer Science, Bowie State University
Theodore O. Poehler, Vice Provost for Research, JHU
Nicholas H. Allen, Senior Vice President and Provost, UMUC
Claudia E. Chiesi, President, Maryland Association of Community Colleges (invited)
Patricia S. Florestano, Secretary of Higher Education, MHEC (ex-officio)
Richard C. Mike Lewin, Secretary, Maryland Department of Business and Economic Development (ex-officio)
To be named, MSDE

University Co-Directors
Ronald L. Larsen, MAITI Director
John E. Osborn, Interim Dean, College of Mathematics and Physical Sciences, UMCP
Sally White, Acting Dean, College of Graduate Education and Research, Towson University
Shlomo Carmi, Dean of Engineering, UMBC
Sadanand Srivastava, Chair of Computer Science, Bowie State University
Toni Ungaretti, Assistant Dean and Director of Undergraduate Studies, School of Professional Studies in Business and Education, Johns Hopkins University
LeeRoy Bronner, Lecturer/Coordinator of MSU/MAITI, Morgan State University
Joann Boughman, Vice President for Academic Affairs and Provost, UMB
Christina A. Hannah, Acting Dean, Graduate Studies and Associate Vice President, Academic Affairs, UMUC

APPENDIX 2. Information Technology Program Enrollments
<table>
<thead>
<tr>
<th>Institution</th>
<th>Computer Engineering</th>
<th>Computer Science</th>
<th>Decision and Information Sciences</th>
<th>Electrical Engineering</th>
<th>Software Engineering</th>
<th>Telecommunications</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMCP</td>
<td>152</td>
<td>160</td>
<td>63</td>
<td>68</td>
<td>123</td>
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<td>760</td>
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<td>UMBC</td>
<td>97</td>
<td>118</td>
<td>41</td>
<td>32</td>
<td>21</td>
<td>720</td>
<td>866</td>
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<td>JHU</td>
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<td>38</td>
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<td>253</td>
<td>112</td>
<td>111</td>
<td>377</td>
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<td>Morgan State University</td>
<td>42</td>
<td>44</td>
<td>62</td>
<td>45</td>
<td>44</td>
<td>466</td>
<td>466</td>
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<td>16</td>
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<td></td>
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Information Technology Program Enrollments

<table>
<thead>
<tr>
<th>Institution</th>
<th>FY96</th>
<th>FY97</th>
<th>FY98</th>
<th>FY99</th>
<th>FY97</th>
<th>FY98</th>
<th>FY99</th>
<th>FY97</th>
<th>FY98</th>
<th>FY99</th>
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</thead>
<tbody>
<tr>
<td>UMCP</td>
<td>59</td>
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<td>42</td>
<td></td>
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<td></td>
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<tr>
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<td>93</td>
<td>20</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JHU</td>
<td>11</td>
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<td>23</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Morgan State University</td>
<td>37</td>
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<td>466</td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>11</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMUC</td>
<td>567</td>
<td>567</td>
<td>508</td>
<td>307</td>
<td>327</td>
<td>2371</td>
<td>2420</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
School of Information Sciences and Technology

The primary goal of the School of Information Sciences and Technology is to address compelling societal needs for leaders in the information sciences and technology field. According to some estimates, more than 1 million computer scientists, system designers, and programmers will be needed nationwide by the year 2005.

The School of Information Sciences and Technology offers a baccalaureate degree program at Penn State's University Park campus and other selected locations and an associate degree program at a number of Penn State locations throughout the Commonwealth.

The IST academic programs have been designed from the ground up specifically for the new school, with substantial input from business, industry, and the public sector. These IST programs have a wide focus in order to educate students about the application of information technology in social and institutional environments as well as in technical and business areas—from communications technology to computer design to geographic information systems to health care management systems.

Courses are integrated, broadly based, and multidisciplinary. They cover the basics of telecommunications and computer science, including database architecture and fundamental computer language skills. They also help students learn general communication and problem-solving skills and promote the use of those skills to develop specific areas of information-based expertise. Courses are intended to provide students with the breadth and depth they need to become leaders in the information sciences and technology fields. Both the associate and bachelor's degree programs require the successful completion of at least one internship experience.

The baccalaureate program allows students to choose one of three options: information systems development, information technology integration, and information, society, and public policy. All students will have to take five core courses and a senior "capstone" course—a project course that will organize students into six-member teams, with at least one student from each option. The bachelor's degree program also includes a foreign languages and cultures requirement.

The associate degree program shares the same core as the baccalaureate program and provides options in business, software, network, Web administration, industrial/manufacturing, data/information, and telecommunications. In addition, there is an option that fulfills many bachelor's degree requirements, allowing students to more easily further their studies. IST also offers an associate degree program that permits students to customize a program of study meet their individual needs. The associate degree program is designed to ensure a thorough knowledge of information systems and includes extensive practice in the use of up-to-date technologies and foster communications, interpersonal, and group interaction skills through active and collaborative learning projects.

Both baccalaureate and associate degree programs have a solid foundation in information systems and applications, organization of information, and information systems architecture and telecommunications. Additional areas for baccalaureate degree program students include logic and discrete mathematics, and computer languages. Other areas include new media and the World Wide Web, and systems analysis.
ENTRANCE TO MAJOR--In addition to the minimum grade-point average (GPA) requirements described by University Policies, the School of Information Sciences and Technology has course requirements for admission to its major. To be eligible for consideration for entrance to the major, a student must have completed the following requirements with a minimum grade of C: IST 110, IST 210, and IST 220. These must be completed by the end of the semester during which the admission to the major process is carried out.

The executive Vice President and Provost of the University have approved administrative enrollment controls limiting the number of students entering the major. Admission to the major will depend on the ranking of the student's cumulative GPA relative to the enrollment limit. Students are guaranteed admission to the major if their cumulative GPA is at least 3.5. (Note: This guarantee is not the minimum GPA required.)

ADMINISTRATION

JAMES B. THOMAS, Dean

JOSEPH M. LAMBERT, Associate Dean

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The University reserves the right to change the requirements and regulations listed here and to determine whether a student has satisfactorily met its requirements for admission or graduation, and to reject any applicant for any reason the University determines to be material to the applicant’s qualifications to pursue higher education. Nothing in this material should be considered a guarantee that completion of a program and graduation from the University will result in employment.

This electronic Undergraduate Bulletin is a version of the official bulletin of The Pennsylvania State University. It is suggested that users refer to this electronic bulletin when seeking the latest information about the University’s academic programs and courses. Printed versions of the Bulletin are also official copies of the programs, courses, and policies in effect at the time of printing. Programmatic expectations for general education are those in effect at the time of admission to degree candidacy, and college and major requirements are those in effect at the time of entry to college and major. These are accurately indicated in each student’s degree audit.

Effective Date: Current

Review Date: 8/13/00

Comments
Informatics Overview

What can you do with a degree in informatics? The answer is almost anything in the expanding field of information technology. These fields are only the beginning:

- Bioinformaticist
- Information Architect
- Interface Designer
- Web Designer
- Database Developer
- Consultant
- Technical Writer

Here's some of the information you need to get started in understanding the School of Informatics at IUB.
Informatics Overview

What is Informatics?

Informatics studies the technical, psychological, and social aspects of information technology and the way people work with and use information. For example, through the study of informatics, you'll learn how to design and implement databases and Web sites that are easier for people to use. You'll also be able to help companies make informed choices about how to integrate new technologies within the workplace with an eye to social and human implications. Through your study of informatics you'll be prepared to deal with the complex challenges of life in the 21st century.

Who uses Informatics?

Informatics can be found anywhere people are using technology to manipulate digital information - virtually everywhere. As an example, consider the following scenario, taking place in a typical hospital. On the ground floor, in what used to be the file room, IT professionals with credentials in database design are transferring hospital records into a new database that will transmit patient information to insurance companies and health care providers around the world. Meanwhile, hospital administrators and lawyers have invited specialists in social informatics and distributed information to address their concerns about keeping patients' digital files confidential, but not so confidential that they are inaccessible to medical professionals who need to see them. Elsewhere, a specialist in human computer interaction is consulting with a nurse to determine how to re-design an ultrasound device so that it is easier for the technician to use accurately. In the lab, bioinformatics professionals are using computer modeling to research a new drug therapy. In the business office, the hospital's web page is being re-designed by a professional with a background in informatics and English.
Careers in Informatics

More and more employers are looking for college graduates with information technology (IT) skills. And they're not just looking for programmers or network-support people anymore. They're looking to fill traditional jobs with people who understand the possibilities new technologies promise. Ask any recent college graduate: IT skills make you marketable. But while there is an incredible demand for this knowledge, employers also want people with good communication and problem solving abilities, the type of skills you'll get with a background in the arts and sciences.

The School of Informatics gives you both. IU's degree program will hone valuable skills that can be transported to a number of job settings:

- A technical understanding of how computing systems operate
- Ability to adapt/assess and apply new trends in IT
- Well-developed problem-solving skills
- Ability to work in teams, such as those formed for the senior capstone project
- Well-developed communications skills to clearly convey solutions and observations to others.
- An understanding of social and ethical principles as they relate to IT issues

Jobs outlook

A promising job hunt is predicted for Informatics graduates. A study by the ITAA estimates more than 300,000 vacancies in core IT positions, and 600,000 vacancies in IT-related positions, and more than 3.2 million vacancies to be filled in the next 5 years. It is difficult to see that there will not be even greater demand for IT professionals in the future.

A partial list of job possibilities

- User experience analyst
- Bioinformaticist
- Data mapper
- Webmaster
- IT consultant
• Multimedia specialist
• Chemical informaticist
• Database designer
• Digital artist
• Human-computer interface designer
• Network manager
• Software developer
• Health informaticist
• Information architect
• Technical writer
• Systems administrator
• Usability analyst
• Interaction designer
• Systems integrator

Salary ranges and benefits for Informatics graduates

A computer support person who is largely self-taught and may not have a college education would probably be in the $10-$20/hour range, depending on expertise and seniority.

An Informatics graduate might start at around $40,000 to $50,000 per year. Besides relatively high salaries, benefits are also usually very good because of the need to lure people to take IT jobs.
Faculty and Courses

The IU School of Informatics brings together faculty members from various disciplines - art, business, computer science, library and information science, education, journalism, mathematics, psychology, biology, chemistry, and many others. Informatics faculty is knowledgeable about the application of information technology to traditional fields. This cross-disciplinary approach underscores the School of Informatics' philosophy that all disciplines are affected by technology and that the change technology brings is important to understand. By working closely with faculty in small classes, you'll get both hands-on technical experience and in-depth discussions of human-oriented issues in the field. You'll also be introduced to new technologies while getting a solid base of skills in your specialty subject area.

A sampling of informatics courses

- 1101: Introduction to Informatics
- 1110: Basic Tools of Informatics I - Programming Concepts
- 1111: Basic Tools of Informatics II - Intro to Databases
- 1200 Informatics Representation
- 1201 Mathematical Foundations in Informatics
- 1202 Social Informatics
- 1210 Information Infrastructure I
- 1211 Information Infrastructure II
- 1300 Human Computer Interaction
- 1400 Topics in Informatics
- 1499 Readings and Research In Informatics
- 1590: Augmented Reality

All course descriptions can be found in the Degrees area of this site.
U523/T561 Fall 2000

Multimedia Development for Music Research and Instruction (3 cr.)

Prof. Eric Isaacson

MWF 1:25-2:15 Room M373 (within the William and Gayle Cook Music Library)

Sections 8446 (T561) and 8473 (U523)

The course is intended for students interested in exploring how technology can be used to facilitate music teaching, learning, and research. During the course of developing a detailed understanding of Macromedia Director, the course will cover the following:

- Survey of existing instructional music software and web sites
- Instructional design principles
- User-interface design
- Sound, photo, and image formats and editing tools
- Representation, manipulation, and display of musical information
- Setting a multimedia computer labs

Requirements will include readings, several short assignments, and a major final project.

Prerequisite: Demonstrable skill with at least one computing application (e.g., a programming language or a word processing, database, or spreadsheet application). Prior enrollment in U396 Intro to MIDI and Computer Music or U521 MIDI and Computer Music will be helpful, but not required. No particular programming skill is required for enrollment, but familiarity with the Macintosh or Windows operating system and related hardware is assumed.

Enrollment in the course under U523 is only for students officially enrolled in the Music Information Technology minor. Students interested in the MIT program should contact Prof. Eric Isaacson (isaacso@indiana.edu). Other interested students should enroll in T561. Total enrollment is limited to 15.

Music Information Technology Minor Program
IU Theory Department Home Page

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