MEMORANDUM

TO: Stephen Halperin, Dean
   College of Computer, Mathematical and Physical Sciences

FROM: Victor Korenman
      Associate Provost for Academic Planning & Programs

DATE: June 27, 2005

RE: Proposal to Offer a Master of Mathematics of Advanced Industrial Technology and Two Post-baccalaureate Certificates in Mathematics of Advanced Industrial Technology and Computational Harmonic Analysis (PCC Log No. 04029)

On June 22, 2005, the Maryland Higher Education Commission (MHEC) approved your proposal to offer a Master of Mathematics of Advanced Industrial Technology and two associated post-baccalaureate certificates. The proposal received final approval by the Board of Regents on June 22. The program is effective beginning the Fall semester of 2005. Enclosed is a copy of the letter from MHEC, along with a copy of the approved program and the signed cover sheet.

The College of Computer, Mathematical and Physical Sciences should ensure that this program is appropriately reflected in all University documentation.

Enclosures

Cc: Sylvester Gates, Senate Chair-Elect and PCC Committee Chair, 2004-2005
    William Destler, Provost
    Mary Giles, University Senate
    Barbara Hope, Data Administration
    Sarah Bauder, Student Financial Aid
    Gay Gullickson, Graduate School
    Anne Turkos, Archives
    Linda Yokoi, Office of the Registrar
    John J. Benedetto, College of Computer, Mathematical and Physical Sciences
June 22, 2005

Dr. Clayton D. Mote, Jr.
President
University of Maryland, College Park
1101 Main Administration Building
College Park MD 20742-5025

Dear Dr. Mote:

The Maryland Higher Education Commission has reviewed the requests received from University of Maryland, College Park to offer a Bachelor of Science in International Business and a Master of Mathematics in Advanced Industrial Technology with two accompanying Post-Baccalaureate Certificates (PBCs). I am pleased to inform you that these programs have been approved. This decision was based on an analysis of the requests in conjunction with the Maryland Higher Education Commission’s Policies and Procedures for Academic Program Proposals and the Maryland State Plan for Postsecondary Education. The programs demonstrate potential for success.

For purposes of providing enrollment and degree data to the Commission, please use the HEGIS codes and CIP codes listed with the programs below.

<table>
<thead>
<tr>
<th>Award Level</th>
<th>Program Name</th>
<th>HEGIS CODE</th>
<th>CIP Code</th>
</tr>
</thead>
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<tr>
<td>B.S.</td>
<td>International Business</td>
<td>0513-00</td>
<td>52.1101</td>
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<tr>
<td>M.</td>
<td>Mathematics of Advanced Industrial Technology</td>
<td>1703-02</td>
<td>27.0103</td>
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<tr>
<td>PBC</td>
<td>Mathematics of Advanced Industrial Technology</td>
<td>1703-02</td>
<td>27.0103</td>
</tr>
<tr>
<td>PBC</td>
<td>Computational Harmonic Analysis</td>
<td>1703-03</td>
<td>27.0103</td>
</tr>
</tbody>
</table>

Should any of these programs require any substantial change in the future, please keep the Commission apprised. I wish you continued success.

Sincerely,

Calvin W. Burnett
Secretary of Higher Education

cc: Ms. Theresa Hollander, USM
    Ms. Diane Hampton, MICUA
July 8, 2005

Dr. C. D. Mote, Jr.
President
University of Maryland, College Park
1101 Main Administration Building
College Park, MD 20742

Dear Dan:

This is to officially inform you that the Board of Regents, meeting on Wednesday, June 22, 2005 at the University of Maryland Eastern Shore, approved the following new academic program proposals for UMCP:

- Master of Mathematics of Advanced Industrial Technology (MAIT) and Post-baccalaureate Certificates
- Bachelor of Science in International Business.

The Committee on Education Policy, meeting on June 1, 2005, recommend that the Board of Regents approve the proposal.

Sincerely,

William E. Kirwan
Chancellor

WEK/mn

cc: Irwin Goldstein
    Teri Hollander
    Katie Ryan
    Calvin Burnett, MHEC
THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

DIRECTIONS: Provide one form with original approval signatures in lines 1 - 4 for each proposed action. Keep this form to one-page in length. Forms and appropriate attachments should be submitted to the Office of Academic Affairs, who will assign a Log Number to each proposal. Also submit an electronic version of as much of the proposal as is possible.

DATE SUBMITTED: DATE

PCC LOG NO. 04029

COLLEGE/SCHOOL: CMPS

DEPARTMENT/PROGRAM: Master in Mathematics of Advanced Industrial Technology (MAIT), Department of Mathematics

PROPOSED ACTION (A separate form for each) ADD X DELETE CHANGE

DESCRIPTION

We propose to establish a Masters program at the Mathematics Department, to be coordinated by the newly formed Norbert Wiener Center for Harmonic Analysis and Application. The program will consist primarily of three to four semesters of coursework, and a one or two semester project in conjunction with the student’s workplace. Target students are local professionals in Technological or Industrial fields with undergraduate degrees in Mathematics, Engineering, Physics, or similar.

JUSTIFICATION/REASONS/RESOURCES

We expect that funds from tuition will be used to support instructors and upgraded computer labs. The Masters Program will also encourage a natural synergy between the University and the local technological businesses which drive the industrial economy today. Stronger ties with industry will lead to undergraduate and graduate student internships, work experience, and postdoctoral appointments, which will greatly benefit the student population and the recruiting potential of the University of Maryland in the worldwide educational market. Finally, as Maryland continues to apply for scientific research grants in the years to come, our improved reputation in areas of modern mathematical application will help to ensure that our grant requests are met with even more success than before.

APPROVAL SIGNATURES

1. Department Committee Chair
2. Department Chair
3. College/School PCC Chair
4. Dean
5. Dean of the Graduate School (if required)
6. Chair, Senate PCC
7. Chair of Senate
8. Vice President for Academic Affairs & Provost

DATE
11/1/04
Nov 1st 2004
Nov 5, 2004
March 15, 2003
3/15/05
4/14/05
6/27/05

VPAAP Rev. 3/1/04
I. OVERVIEW AND RATIONALE

We propose to establish a Master of Mathematics of Advanced Industrial Technology (MAIT) in the Mathematics Department. The program will be coordinated by a special committee of Mathematics Department faculty associated with the Norbert Wiener Center for Harmonic Analysis and Applications located in the department, and admission will be overseen by the Associate Chair for Graduate Studies. Target students are local professionals in technological or industrial fields with undergraduate degrees in Computer Science, Engineering, Mathematics, or Physics. The Masters program will encourage a natural synergy between the University and the local technological businesses which drive the present industrial economy.

The intellectual heart of the program is what we call Mathematical Engineering, which will be to today’s mathematics departments what Mathematical Physics was to those of a century ago. At that time, Mathematical Physics provided the impetus for tremendous advances within mathematics departments, with particular impact in fields such as differential equations, operator theory, and numerical analysis. Tools developed in these fields were essential to the advances of applied physics, including the development of the solid state devices which now enable our information economy. In the coming years, Mathematical Engineering will impel the study of fundamental harmonic analysis issues in the theory and applications of signal processing, modeling, and control, in the mathematics departments of the near future. Fields like RF and Optical Communications, Signal and Image Processing, Sensor Networks, RADAR and SONAR, Navigations and Avionics, Medical Imaging and Diagnostics, Control Systems, Robotics, and others increasingly rely on fast, embedded mathematical algorithms executing on the latest microprocessors, micro-controllers and Digital Signal Processing (DSP) cores. Budding fields such as Bioinformatics, Nanotechnology, Data Mining and Quantum Computing are likewise being built from the ground up around modern mathematical methods. The Mathematics that is central to these fields is at the forefront of modern mathematical research. Current research in mathematical harmonic analysis is often immediately transformed into technological innovations. Engineers and scientists that understand modern mathematical toolsets will have the edge in creating tomorrow’s technologies. The results will help advance the technologies of the new millennium, such as quantum information processing, brilliant materials/devices, and ubiquitous sensor/processor networks. Providing an educational forum to teach these skills is the mission of the Master of Mathematics of Advanced Industrial Technology.

Adding this new program to the ENPM and ENTS programs already in place in the Engineering School will serve to expand the overall latitude of Masters options at the University of Maryland, increasing our marketability to the government and industrial laboratories in our area. Stronger ties with industry will lead to undergraduate and graduate student internships, work experience, and postdoctoral appointments, which will greatly benefit the student population and the recruiting potential of the University of Maryland in the worldwide educational market. Finally, as Maryland continues to apply for scientific research grants in the years to come, our reputation in areas of Mathematical Engineering will help to ensure that our grant requests are met with even more success than before.
II. CURRICULUM

The focus of MAIT is to present working scientists with a coherent package of rigorous, state-of-the-art, and genuinely applicable mathematical techniques, developed to a large extent in order to resolve current industrial and government scientific problems. As documented below, the curriculum is designed to present these techniques and subjects in an applicable setting.

The program is intended primarily for working-professional students attending classes on a part time basis. Typical course loads for a Masters student will be 1-2 courses per semester over a 2-5 year period. To facilitate working students, the majority of class sections will be offered in evening hours between 5 and 9 PM.

Admissions Criteria:

The Master of Mathematics of Advanced Industrial Technology (MAIT) is open to qualified applicants holding a regionally accredited baccalaureate degree in Computer Science, Electrical Engineering, Mathematics, Mechanical Engineering, Physics, or other technical fields, with a sufficient background in Mathematics as described below. In addition to submitting a Graduate School admission application with fee, an official copy of the applicant's college transcripts and three letters of recommendation are required for evaluation. The Graduate School requires as a minimum standard for admission a B average (3.0 on a 4.0 scale) in all courses resulting in the award of a baccalaureate degree from a regionally accredited college or university.

The prerequisite background in Mathematics should include Calculus, Differential Equations, and Linear Algebra, as well as at least one of the following:

- Mathematical Computation experience;
- Courses in Scientific Computation, Digital Signal Processing, and/or Numerical Analysis;
- Boundary Value Problems, Fourier methods, Complex Variables.

These courses will be made available to students who wish to enter the program but have not yet completed all of the prerequisites.

Academic Results:

The MAIT program will grant the following degrees and certificates:

- Master of Mathematics of Advanced Industrial Technology
- Graduate Certificate in Mathematics of Advanced Industrial Technology
- Graduate Certificate in Computational Harmonic Analysis

Details and requirements for each of these academic awards are described in this proposal.
Master of Mathematics of Advanced Industrial Technology:

Each student will take classes for 2-5 years, and will be assigned a faculty advisor to determine the appropriate curriculum. The class schedule will include three 3-credit core courses (one per semester), to be developed and implemented over the coming year, as well as elective courses to be chosen from a list of about ten, and a one or two semester project course to total 30 credits. The degree of Master of Mathematics of Advanced Industrial Technology will be awarded contingent on the student completing these 30 credits with a GPA of at least 3.0. Students will be given the option to take five elective courses and a two semester project, or six elective courses and a one semester project. The core courses and some of the electives will be new courses developed specifically for the MAIT program. Students who have already completed coursework similar to the core curriculum will be evaluated by a faculty advisor and given an alternative core curriculum to be determined by the administration from among program electives on a case-by-case basis. The standard University time limit of five years from the date of matriculation for completion of a master’s degree will apply.

Besides standard coursework, the student must complete a project course for credit with a written paper. The project could be (and will be encouraged to be) work-related. The project will be a study performed by the student in an area related to the courses taught in the Masters program or a current project at the student’s workplace. Students will sign up for MAIT 699 with a MAIT faculty member who will supervise the project directly or who will approve and generally oversee a project with a direct supervisor associated with the student’s workplace. The nature of the project is flexible and will be determined jointly by the student and the direct supervisor, with approval as above. The final written report describing the project must be prepared by the student and approved by the project advisor and the MAIT faculty supervisor, who will assign a course grade.

Below are listed the basic course outlines, with full course descriptions and course proposals to be submitted through the appropriate Colleges by January 2005. We have begun the process of ensuring that the courses for the MAIT program will be suitable to be offered under the aegis of the department. The mechanism to guarantee suitability will be based on regular communication with the Chair of the Mathematics Department, the Associate Chair for Graduate Studies in the Mathematics Department, and the Graduate Subcommittee of the Advisory Committee of the Norbert Wiener Center for Harmonic Analysis and Applications.

The three core courses are:

- **Applied Fourier Analysis**

  Theory, practice, and implementation (MATLAB) of Fourier analysis with applications in signal processing. Topics include the Fourier transform for periodic and non-periodic functions in continuous and discrete time, generalized functions, sampling theorems, fast computational algorithms for transforms and convolutions, filterbanks and multirate systems.
• **Modern Mathematical Methods for Signal Image Processing I** (based on the first half of “A Wavelet Tour of Signal Processing by Stéphane Mallat)

Introduction to current signal/image processing techniques, including wavelets and frames, in the context of applied and numerical harmonic analysis. Topics include time-frequency and time-scale representations, sub-band filterbanks, and applications to compression and denoising.

• **Advanced Applied Linear Algebra** (based on the Trefethen or Higham books)

Tools and techniques of computational linear algebra for applications. Topics include: linear systems and least squares problems, error analysis, accuracy and stability, matrix decompositions, iterative solvers, Krylov subspace methods, symmetric and non-symmetric eigenvalue problems, singular value decomposition.

The electives will include:

• **Introduction to Scientific Computing**

(Same as AMSC 660) Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software of each topic.

• **Statistical Pattern Recognition and Classification** (texts of Tribishani and Hastie; “Introduction to Statistical Learning Theory”)

This is a new course. Mathematical and statistical tools for decision making based on categorization of patterns present in data. Topics include regression, feature extraction, dimensionality reduction, parametric and non-parametric approaches to decision, estimation, and classification problems.

• **Modern Mathematical Methods for Signal Image Processing II** (based on the second half of “A Wavelet Tour of Signal Processing by Stéphane Mallat)

Advanced studies with state of the art signal/image processing techniques in the context of applied and numerical harmonic analysis. Topics include stable signal representation techniques (for noise reduction) and erasure channel problems, second-generation wavelets, geometric sub-division schemes for multi-dimensional problems, level set approaches, applications in estimation and analysis of sensor data, non-uniform sampling methods.

• **Fast Multipole Methods**

Introduction to the fast multipole method, a matrix compression computational scheme analyzing wide classes of structured operators arising in physics, data analysis, and visualization. Topics include: single and multi-level FMM, iterative solvers, non-
uniform interpolation schemes, Fast Gauss Transform, solutions of Laplace and Helmholtz equations.

- **Quantum Information, Detection, and Computation**

Introduction to information processing tasks implemented on fundamentally quantum mechanical systems. Topics include background physics, mathematics, and information theory, quantum cryptography, teleportation, super-dense coding, quantum computation, Shor's algorithm, quantum error correction, quantum limits in detection and estimation.

This list of electives will expand and change depending on the scientific needs of the technological community whom we serve. In particular we intend to present the following courses within the next year:

- Mathematical Methods in Nanotechnology
- Biomathematics
- Fast Acquisition Techniques in MRI
- $\Sigma\Delta$-quantization Methods in Communications and Radar

We anticipate offering more and varied special topics courses as the program develops over five years. In the event that there is insufficient student enrollment to support all of the classes, some special topics courses maybe offered less frequently.

**Graduate Certificates to Enhance Program Appeal and Revenue:**

For a working engineer faced with 10 courses at one per semester, the Masters degree is a long road to follow. We can make the program more appealing and broaden the prospective audience by offering Graduate Certificates in addition to the Master of MAIT degree. These certificates will make the program more saleable and are likely to generate increased revenue over a program offering only the Masters degree.

The goal of offering Graduate Certificates is to:

1. Provide a near term focal point for the engineer looking to beef up his or her résumé.
2. Draw in interested students who might very well continue into the Master's level.
3. Draw in students who already have Masters or other advanced degrees but want targeted expertise in Harmonic Analysis and Applications.

Two complementary options are contemplated below, one a generic subset of the Masters program, the other a specific offering tailored to the core focus of the center. Summary descriptions follow.
Graduate Certificate in Mathematics of Advanced Industrial Technology

For students wishing to enhance their career skills in specific subject matter, the Center offers a Graduate Certificate in Mathematics of Advanced Industrial Technology to students completing 4 courses (12 credits) within the program. The program will include at least 2 of the core courses and 2 listed electives to be completed with a GPA of 3.0 or higher.

Graduate Certificate in Computational Harmonic Analysis

The Norbert Wiener Center offers a specific Graduate Certificate concentration in Computational Harmonic Analysis. This 12-credit program is tailored to working engineers and scientists wishing to advance their understanding of the latest Fourier, Wavelet, and Time-Frequency Harmonic Analysis methods and algorithms. The program will include the following courses: Applied Fourier Analysis; Modern Mathematical Methods of Signal and Image Processing parts I and II; and a fourth elective selected with the approval of the students advisor. Coursework must be completed with a GPA of 3.0 or higher.

III. FACULTY AND ORGANIZATION

The core courses of the program will be taught by the regular faculty associated with the MAIT program consisting of Professors Benedetto and Healy and the proposed appointments, who will also be the faculty advisors. Other courses will be taught by adjunct mathematics faculty who are industrial professionals and international experts, as well as regular faculty from other departments in the University. As an extension to our partnership with local industry, we shall look to the government labs that employ our students as a source of both adjunct faculty and appropriate curriculum. Consistent with University policy, adjunct faculty teaching in the program will need to be appointed as members of the Graduate Faculty.

IV. REQUIRED PHYSICAL RESOURCES

The Master of Mathematics of Advanced Industrial Technology Program is run exclusively by the Department of Mathematics through their Norbert Wiener Center. As such, the required facilities, including classrooms, faculty offices, and computer labs, will be limited to those already at the disposal of the Department of Mathematics.

In addition, all students in the Masters and Certificate Programs will be granted access and borrowing privileges to the extensive collection of relevant texts, treatises, and journals in the Engineering and Physical Sciences Library located in the Glenn L. Martin Hall of Technology. Our library collection of relevant books and journals, which supports a robust and wide ranging research program, is completely adequate to cover the reference requirements of the students in the MAIT courses and program.
V. OTHER ISSUES

Depending on the development of the program and the travel needs of our students, we may eventually find it both necessary and beneficial in the long term to teach classes in off-campus locations.

VI. RESOURCE NEEDS AND BUDGET JUSTIFICATION

The table below presents the expected number of students to be admitted to the Master of Advanced Industrial Mathematics program during years one through five. This appendix also outlines the associated number of new courses to be offered as well as an overview of the financial resources and expenditures.

The number of students as estimated represents a reasonable target given our knowledge of the potential applicant pool. However, since fixed costs are proportional to enrollment if we fall below our estimated targets then associated costs would be reduced.

Number of Credit Hours/Program Revenue:

We are estimating that all students entering the program will take classes on a part-time basis. The students are broken down into two categories: A) those that will complete the program in two years and B) those that will complete the program in five years. We recognize that there will also be some number of students who will take classes without completing the program. Therefore, a portion of the students in category B are understood to be a permanent rolling number who will take classes but may not attain a degree.

Students in category A will take fifteen credits (5 classes) per year to graduate in two years. Students in category B will take six credits (2 classes) per year to graduate in five years. In fiscal year 2006 we anticipate enrolling 15 students who will take five classes per year (225 credits) and 12 students who will take two classes per year (72 credits) for a total of 297 credit hours. Our revenue figure is derived by multiplying this number against 92.5% of our tuition rate of $550 per credit hour.

Salaries and Wages:

Faculty who will teach in this program consist of existing permanent faculty, new hires specific to this program and adjunct faculty who will teach on an as needed basis.
Our current faculty members, Drs. John Benedetto and Dennis Healy will teach in this program. We expect Dr. Benedetto to teach one class per year and Dr. Healy to teach two classes per year. Dr. Benedetto will also have a one course buyout per year and summer pay to allow him time to handle administrative duties associated with MAIT. The permanent faculty salaries (D1.e) and the course buyout of the program director (D1.h) are listed at $20,000 per course. This number includes both the buyout amount and the associated fringe benefits. The fringe benefit amount is paid by moving a percentage of the faculty FTE to the MAIT account (which is then assessed the proportional fringe benefit amount).

We expect to hire two new permanent faculty in the Department of Mathematics who will teach primarily in the MAIT program. One hire will be a junior faculty and one will a senior faculty. Their respective salaries will be in the range of $65,000 to $85,000 per year. We have calculated their fiscal cost (D1.f) to this program as having a teaching load of 2 courses per year for FY 06/07 and three courses per year thereafter. Therefore we use their salary amount plus a 28% fringe benefit rate multiplied by 15% per course. This number would represent the true teaching cost to the program. Again, fringe benefits will be paid by moving a percentage of the faculty FTE (15% per course) to the MAIT account.

Adjunct faculty (D1.g) will be hired on an as needed basis to teach additional classes. They will be paid at the rate of $7,500 per course. Adjunct faculty are not eligible for fringe benefits.

Salaries for administrative staff (D.3/D.4) are charged proportional to the amount of time they will devote to the MAIT program. The Coordinator will charge 50% and the Scientific Director will charge 75%. Fringe benefits are calculated at 28% of the associated FTE.
### A. # of Credit Hours

<table>
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<tr>
<th>Item</th>
<th>FY2006</th>
<th>FY2007</th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering Students taking 2 courses per year</td>
<td>12</td>
<td>8</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>6 credits</td>
</tr>
<tr>
<td>Entering Students taking 5 courses per year</td>
<td>15</td>
<td>12</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>15 credits</td>
</tr>
<tr>
<td>Total number of Students in Program</td>
<td>27</td>
<td>47</td>
<td>57</td>
<td>70</td>
<td>81</td>
<td></td>
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(See table 2 for factoring of total students/credits)

### B. Program Revenues

<table>
<thead>
<tr>
<th>Item</th>
<th>FY2006</th>
<th>FY2007</th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Tuition is $550 per credit hour. Program retains 92.5% of tuition revenues.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### C. Courses

1. Classes to be covered
   - New course sections needed | 8 | 12 | 16 | 16 | 16 |
   - Program Director course buyouts | 1 | 1 | 1 | 1 | 1 |
   - Total Classes to be covered | 9 | 13 | 17 | 17 | 17 |

### D. Salaries & Wages

1. Course Faculty
   - Courses covered by existing permanent faculty | 3 | 3 | 3 | 3 | 3 |
   - Courses covered by new permanent faculty | 2 | 4 | 6 | 6 | 6 |
   - New permanent faculty salaries | $24,960 | $57,600 | $86,400 | $86,400 | $86,400 |
   - Adjunct faculty salaries | $22,500 | $37,500 | $52,500 | $52,500 | $52,500 |
   - Course buyouts of program director | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
   - Existing permanent faculty salaries | $60,000 | $60,000 | $60,000 | $60,000 | $60,000 |
   - New permanent faculty salaries | $24,960 | $57,600 | $86,400 | $86,400 | $86,400 |
   - Adjunct faculty salaries | $22,500 | $37,500 | $52,500 | $52,500 | $52,500 |
   - Course buyouts of program director | $20,000 | $20,000 | $20,000 | $20,000 | $20,000 |
   - Existing permanent faculty salaries | $60,000 | $60,000 | $60,000 | $60,000 | $60,000 |

### E. Operating Expenses

1. Postage and Telephone | $1,500 | $1,500 | $1,500 | $1,500 | $1,500 |
2. Travel | $3,000 | $3,000 | $3,000 | $3,000 | $3,000 |
3. Printing & Copying | $1,500 | $1,500 | $1,500 | $1,500 | $1,500 |
4. Advertising | $5,000 | $5,000 | $2,500 | $2,500 | $2,500 |
5. Furniture/Computers | $0 | $0 | $2,500 | $2,500 | $2,500 |
6. Other (including student support events) | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |

### F. Campus Income

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<thead>
<tr>
<th>Item</th>
<th>FY2006</th>
<th>FY2007</th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
<th>Notes</th>
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<tr>
<td>Master of Mathematics of Advanced Industrial Technology</td>
<td>$12,251</td>
<td>$21,656</td>
<td>$23,760</td>
<td>$27,720</td>
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Shortfall in year 1 - 3 will be covered by startup funds from Deans office
## Master of Mathematics of Advanced Industrial Technology - Table 2

<table>
<thead>
<tr>
<th>Students</th>
<th>Year 05/06</th>
<th>Year 06/07</th>
<th>Year 07/08</th>
<th>Year 08/09</th>
<th>Year 09/10</th>
<th>Year 10/11</th>
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<tr>
<td>(5 classes per yr)</td>
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<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>5 Year Completion</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<td></td>
</tr>
<tr>
<td>(2 classes per yr)</td>
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<tr>
<td>Total</td>
<td>27</td>
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<td>70</td>
<td>81</td>
<td>80</td>
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<table>
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<tr>
<th>Credit Hours</th>
<th>Year 05/06</th>
<th>Year 06/07</th>
<th>Year 07/08</th>
<th>Year 08/09</th>
<th>Year 09/10</th>
<th>Year 10/11</th>
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<td>2 Year Completion</td>
<td>225</td>
<td>225</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(5 classes per yr)</td>
<td>(15x5x3)</td>
<td>180</td>
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<tr>
<td></td>
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**Personnel:**

The Chair of the Mathematics Department will provide Professor Benedetto the opportunity to divide his teaching responsibility between the Masters program and regular departmental teaching. Professor Dennis Healy is committed to teach one course at the Mathematics Department each semester, and the Chair of the Mathematics Department has agreed, pending final approval, to allow Healy to devote all of his teaching to courses in the MAIT program. As per the budget above, we shall hire 3 adjunct faculty members who will teach the remainder of the courses for MAIT.

In addition, we would like to make the following appointments:

- Two new faculty members within the next two years: one senior tenured position, and one tenure-track.
- We shall advertise a senior position for Scientific Development, which will be given to a highly qualified scientist with close ties to industry, who will act as the Center’s direct conduit to the labs from which we wish to recruit.
- We shall hire a staff-level Program Coordinator who will take on the duties currently being filled by graduate student Christopher Shaw.
- In the next two years, we would like to add two postdoctoral researchers who will work in a research capacity for the Norbert Wiener Center and be available to work in a teaching capacity for the MAIT program.

**Appendix I: Distinguishing MAIT from other Masters Programs at UM**

The MAIT program is designed specifically to serve the needs of working professionals. This, along with the unique focus and course content, set it apart from the AMSC and MATH curricula. Further, since MAIT offers a mathematics degree, it will not draw from the same pool of students as the engineering programs offered by ENPM and ENTS. However, this does not prohibit us from cross-listing courses with other programs. Indeed, it is likely that certain courses (such as AMSC660) fit into MAIT as well as other curricula. In these cases, it makes sense to cross-list the course and offer it in the evening for both programs. Thus, the burden of salary expenditures could be shared proportionally among the programs which benefit from the enrollment. This provides "course coverage insurance" against possible poor attendance of a particular course in a particular program.

We have discussed the program with Faculty and Administration in AMSC and the Engineering Masters Programs, who were all supportive of the creation of the MAIT program and its placement in the Mathematics Department. We have received a letter from the ENTS Director, Dr. Steven Tretter. We have requested and expect to receive letters from the AMSC and ENPM programs.

We have also received a letter from the Chairman of the Department of Mathematics in support of the program. In particular, his letter addresses the possibility that the MAIT Masters Program will compete with programs currently offered in the AMSC Program.