

Co-terminal Degree Program: Bachelor+Master of Science in Applied Mathematics

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Highlights/Narrative Part of the Proposal

The dual-degree B.S./M.S. program in Applied Mathematics was established in 2009. Due to the new regulation of the co-terminal degrees, in particular, the new rule allows sharing of credit hours (up to 9 credit hours). We propose to change our existing dual-degree program, namely B.S./M.S. in Applied Mathematics, so that we take advantage of the sharing of credit hours. Since the program already exists, we do not provide all the documents listed on the 802 form as many of them become unnecessary.

Description of the courses shared between the undergraduate (B.S. in Applied Math) and graduate (M.S. in Applied Math) programs

Our department offers a few dual-delivery courses, which allows students to choose courses shared between the undergraduate and graduate programs easily. For example, our department has Math477 (Numerical Linear Algebra) and Math577 (Computational Mathematics I), which have the same lectures but different homework assignments, projects and exams. Students in the proposed co-terminal BS/MS degree program will take the 500-level version of three such courses which then can be counted toward their undergraduate program as shared credits. Even if a student in the program does not choose these dual-delivery 400/500-level courses, (s)he still can share 9 credit hours easily because our MS program allows for 9 credit hours at the 400-level counted toward the total degree hour requirement (32 credit hours).

Motivation and Overview

The existing dual-degree program is designed for students wishing to obtain a combined BS and M.S. degree in Applied Mathematics. A typical MS degree requires 2 years after the BS degree. This program can potentially reduce the time to an MS degree by one year or more for bright students with sufficient AP or transfer credits. This motivation does not change for the co-terminal degree. The only change in the new (co-terminal) program vs. the old (dual-degree) program is that the students are allowed to complete the credit hour requirements for both degrees with up to 9 credit hours shared between the two programs. In the old program, students have to take advantage of having AP credits when entering IIT. Instead of graduating from IIT in less than four years with only a BS degree, the students stay at IIT and take graduate-level courses that will be counted toward earning a graduate degree. In the old (dual-degree) program, the core and course requirements for each of the degrees remain the same. In the new (co-terminal) these requirements are also kept in place. However, credit sharing of up to 9 credits is allowed.

Given that incoming students typically have had advanced courses during their high school, a

faster and, if preferred, research oriented program can also be opted for. This is especially true for Camras scholars who are typically keen to continue for graduate studies and participate in research. A sample five-year plan is provided below. In the following sample program, students might finish even earlier if they took courses during summers. Students can participate in the research projects being carried out in the department, possibly complete MATH491 (UG independent study) credits and continue for MATH591 (MS thesis).

Five-year combined BS/MS programs exist at various universities, including Arizona State University, University of Maryland, University of Tennessee, WPI, etc.

The advantages of a combined degree program are typically:

- i. Provide high-quality students opportunities to obtain both BS and MS degrees within five years, cutting the length of an MS degree by up to at least one year;
- ii. Offer students chances to link the advanced undergraduate course work with graduate course work;
- iii. Provide students with research opportunities during their early years of study;
- iv. Prepare bright students for a PhD program in Applied Mathematics or Mathematics in an elite graduate school;
- v. Offer an enhanced academic environment with accelerated learning;
- vi. Simplify the graduate admission procedure.

Admission and Continuation in the Program

Because the program is designed for high quality students who are determined to get an advanced degree in Applied Math or Math, the math course loads are heavy in most semesters. The students satisfying the following requirements are eligible to apply to the BS/MS combined program:

1. The student must have completed four semesters of full-time study in the BS program, or have at least 80 credit hours (including transfer credits).
2. The student must have an overall GPA of 3.25 or better for all courses.
3. The student must have a GPA of 3.5 or better for math courses.

Applications must be accompanied by an official transcript and three letters of recommendation. At least two letters of recommendation are from departmental faculty members. These two letters shall attest to readiness and probable success in completing the graduate program. GRE scores are not required for this dual degree program. Applications are reviewed and processed by the Graduate Director of the department.

The student must maintain a graduate GPA of 3.00 or better in order to continue the combined program. The student will obtain two degrees, one a BS in Applied Mathematics and the other an MS in Applied Mathematics. Credit requirements of both degrees subject to credit sharing of up to 9 credits as discussed above.

The students in the program may choose to obtain a BS degree only and not to complete the requirements of the MS degree. The credits hours in graduate-level math courses will be counted toward the BS degree requirements as Applied Math Electives or Free Electives. Students in the program cannot obtain an MS degree unless they satisfy the requirements of the BS degree and get a BS degree in Applied Mathematics.

Financial Assistance

Students may be offered Research Assistantships at any time during the program. Students in the program will be eligible for all scholarships and financial aid packages for undergraduates, as long as they don't have BS degree. They are eligible for Dean's Fellowship when they have obtained equivalent credit requirement for BS degree and still have at least 18 credit hours to complete the combined degree program. They can also apply for financial loans for graduate students if they get the BS degree. Furthermore, students in the program can apply for external funding. For example, they can apply for the NSF Graduate Fellowship in their fourth year and fifth year in the five-year program.

Sample Program

Five-year Dual Degree Program

There are a few dual-delivery courses in our department, such as MATH 476/563, MATH 477/577, MATH 478/578, MATH 481/542, etc. Students in the program are not allowed to take these dual-delivery courses both at the 400-level and 500-level. For the graduate degree, we require students take at least two core sequences. In the sample program we assume students take MATH 577 and MATH 578 core and either MATH 543 and MATH 544 or MATH 500 and MATH 501 in the sample program. However, any two core sequences are allowable. Three of these four core sequence courses will be credit-shared with the undergraduate program and count as one of the 6 required MATH electives, and two of the three free elective included in the standard BS program, i.e., the sample program below still contains 5 applied math electives and one free elective.

Should a student come in with AP credit for at least MATH 151 (Calculus I), then no summer courses will be required. This is a very common scenario.

Suggested Plan:

First semester

MATH 100	3
MATH 151	5
CS 115	2
Humanities 100-level Elective	3
Science Elective	3

Totals 16

Second semester

MATH 152	5
MATH 230	3
CS 116	2
PHYS 123	4
Humanities or Social Science Elective	3

Totals 17

1st-year Summer MATH 251	4
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Totals	4
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Third semester

MATH 252	4
MATH 332	3
MATH 430 or 454	3
Minor Subject	3
Science Elective	3

Totals	16
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Fourth semester

MATH 350	3
MATH 402	3
Applied Math Elective	3
Minor Subject	3
Humanities or Social Science Elective	3
Humanities or Social Science Elective	3

Totals	18
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Fifth semester

MATH 400	3
MATH 475	3
Applied Math Elective	3
Minor Subject	3
Humanities or Social Science Elective	3
Humanities or Social Science Elective	3

Totals	18
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Sixth semester

Applied Math Elective	3
MATH 5xx	3
Minor Subject	3
Science Elective	3
I PRO 397	3

Totals 15

Seventh semester

Applied Math Elective 3

MATH 500 or MATH 543 3

MATH 577 3

Applied Math Elective 3

Minor Subject 3

Totals 15

Eighth semester

MATH 501 or MATH 544 3

MATH 578 3

Free Elective 3

Humanities or Social Science Elective 3

I PRO 497 3

Totals 15

Ninth semester

3 grad courses 9

Totals 9

Tenth semester

1 grad courses 3

MATH 591 6

Totals 9

Total credits:

119 (undergraduate, 100-400 level)

33 (Graduate, 500 level)

= 152

= 161 – 9 (shared)