Form 802, new co-terminal BS MS program, sections

BS / MS in Molecular Biochemistry and Biophysics

CIP codes

Biophysics 26.0203
Molecular Biophysics. 26.0206

Undergraduate Program

Total undergraduate program Credit hours

129

Program Descriptions

The program contains coursework in Biology, Chemistry, Physics and Mathematics aimed at providing an understanding of how molecules relevant to living systems work. There is a core of required foundational classes in each discipline. The MBB undergraduate curriculum was recently revised to provide flexibility in the form of technical electives consisting of advanced classes in this area that allow students to tailor to the degree to suit their career aims and interests. It also contains coursework to satisfy IIT general education requirements.

Program purpose

The objectives of the BS Molecular Biochemistry and Biophysics program is to:

- Provide a basic understanding of how molecules relevant to living systems work
- Prepare students for
    - Careers in the life and physical sciences, and especially those requiring knowledge of both areas
    - Entry into the graduate and other postgraduate schools in biophysics, biochemistry and related areas.

Program benefits

This co-terminal program allows students to complete an MS in one additional year, which will make them more competitive for admission into top-tier PhD programs

Course requirements

See attachments

Sample curriculum

See attachments

Competitive programs

Most universities operating in the sciences offer biochemistry programs, and many offer biophysics. Fewer offer a dual biochemistry/biophysics focus similar to our MBB program. There are some however:

Yale

http://medicine.yale.edu/mbb/

This is probably the most similar, with a focus on educating scientists. They offer BS and PhD, but it seems not MS degrees.

Texas A&M U

https://biochemistry.tamu.edu/academics/graduate-program-2/

This program also has a similar scientific focus. This program offers BS PhD and MS degrees, but students are not accepted into an MS degree, which is only offered as an election by PhD students (as booby-prize, presumably)

IA State

https://bbmb.iastate.edu/

A combined Department of Biochemistry, Biophysics and Molecular Biology offers BS, MS and PhD degrees in Biophysics ***OR*** Biochemistry - but not a combined co-terminal program.

There are some that only operate only at the PhD level, mostly at medical school:

U MN Rochester

https://www.urmc.rochester.edu/biochemistry-biophysics.aspx

This program is situated in a School of medicine, and only operates as the PhD level.

U Penn

http://www.med.upenn.edu/biocbiop/

This program is also situated in a School of medicine, and only operates as the PhD level.

A co-terminal program would allow a one year MS, which is generally not possible in these programs. This also targets our own existing students who can stay here so that there is a low barrier to transition, making this option very attractive.

Market analysis

Marketing and Advertising

This program only accepts existing IIT students, so they will simply be made aware of it in advising.

Enrollment estimates

We enroll ~1-4 MBB students per year. Most of these are very good students, and >75% of them go on to graduate or professional schools. They do not always go directly into PhD programs, sometimes preferring a MS program. Some aim at top tier, very competitive programs, many of which generally only accept students with an MS, and the co-terminal will allow them to achieve this quickly, and with a low barrier to entry. We estimate that ~1 -2 students per year may enroll.

Retention estimates

Students who enroll are good students (GPA>3.25) and virtually 100% are expected to complete this program.

Economic analysis

This program does not cost anything, since it required no additional resources, relying on existing BS and MS programs for all coursework etc. As such, even with modest enrollments it is revenue-positive.

In the required spreadsheet, tuition has been based on 1 students at the UG tuition rate at a 40% discount rate (FY2017, $43500 *1*0.6 = $26100, and with 4% annual increases).

Program Name - Economic Analysis							
Estimate of Expense							
		Academic Year 1		**Academic Year 2**		**Academic Year 3**	
Faculty		number	$ amount	number	$ amount	number	$ amount
	full-time		$0		$0		$0
	Part-time		$0		$0		$0
Staff			$0		$0		$0
Course developement			$0		$0		$0
Market Survey			$0		$0		$0
Advertizing			$0		$0		$0
Miscellaneous			$0		$0		$0
Total			$0		$0		$0
Notes							
Revenues*			$26,100		$27,144		$28,230
Estimate of Profit			$26,100		$27,144		$28,230
*Revenues are based on tuition income.							

Graduate Program

1) Program overview

Objectives

The objectives of the MS-MBB program are to:

- Deliver a graduate level understanding of the biochemistry and biophysics of molecules relevant to living systems.
- Prepare students for entry into top tier PhD programs.
- Prepare students for careers in research and development in biophysics and biochemistry.

2) Program justification

Why the program is needed

We have some students who are very good students wish to enter this program. The chief motivation for them is that they are interested in admission to top PhD programs that only recruit students with MS degrees. This program will allow them to obtain it here at IIT with a very low barrier to entry. Without it they would likely move to other schools for this MS, or seek direct entry into (different) PhD programs.

It is also possible that some of these students may join labs here at IIT and become comfortable and productive and decide to stay here for a PhD. This may thus help our PhD program better attract these very competitive students.

Relationship to other programs

This combines two existing programs, BS MBB and MS MBB.

Estimated student numbers

~1 per year. We have a parallel effort to revise the BS MBB to make it more attractive, and with modest effort to develop that feeder program, this could easily double in the near term.

3) Program resources

Personnel needed

None

Facilities needed

None

4) Program description

Degree requirements

1. Minimum credit hours

32

2. Thesis requirement

There are two tracks, one of which requires a thesis. Entry in to the thesis track is predicated on acceptance by some faculty member as a research students.

a. Thesis track
   In the BS program:

One technical elective must be BIOL/CHEM/PHYS 491, 3 ch

In the MS program:

BIOL/CHEM/PHYS 591 6ch

Production of an acceptable MS thesis

b. Non-thesis track

In the MS program:

BIOL 581 + BIOL5xx elective, 6 ch.

3. Project course

No

4. Project report

No

5. Comprehensive exam

Yes – Biology MS program profex

6. Thesis defense

There are two available tracks, and one of them required a thesis. MS theses in biology not require an oral defense, but must be approved by two faculty readers.

7. Required courses

Shared (9 ch)

BIOL 402, 544, {446, 431, and 404}) (choice of 400 level lab in BS program)

Not shared (12 ch)

BIOL 515, 533, 512, 555

Track options, one of which adds an additional required course

a. Thesis BIOL/CHEM/PHYS 591 6ch
b. Non-thesis BIOL 581 + BIOL 5xx elective

8. Elective options

Grad elective, two of (5 ch)

Any BIOL/CHEM/PHYS 5xx lecture or lab class

Track options (6 ch), one of which adds an additional elective

a. Thesis BIOL/CHEM/PHYS 591 6ch
b. Non-thesis BIOL 581 + BIOL 5xx elective

Admission criteria

GPA > 3.25 at time of admission

Timeline

Students are eligible to apply for admission after having completed 60 ch at the undergraduate level. This is generally in the first semester of third year. They are generally admitted in the second semester of third year. This program is designed to be completed in 5 years total.

5) Shared courses

Required

BIOL402, BIO544, BIO{446, 431, 404} (choice of 400 level lab in BS program)

Electives

None

Substitutions, exceptions and restrictions

Substitutions must be approved by the MBB co-terminal program advisor.