

NEW PROGRAM PROPOSAL

ILLINOIS INSTITUTE OF TECHNOLOGY

The following information is required to approve a new program. When using this template, move the cursor a little to the right of label, click to place the cursor there, and then type or paste in as much information as needed. Typing or pasting in text will move subsequent labels farther down the page. Each main section (General Information, Marketing Information, and Academic Information) begins a new page.

College: CSL

Department: BCPS

Date: 21 March 2006

Approvals Required

(1) Academic Unit Head:

(2) Dean:

(3) Other:

GENERAL INFORMATION

Program Title: Bachelor of Science in Biochemistry

Program Scheduling (*Next to the appropriate semester, click on the blank and type in the year*):

Fall 2007 Spring Summer

Program Level: Undergraduate X Graduate

Total Program Credit Hours: 128-130

Program Description: *Provide a brief narrative of the program content (use as much space as needed) .*

The BCPS department is proposing a new degree program in Biochemistry intended to prepare students for entrance into post baccalaureate programs in the health professions or the basic sciences. Biochemistry is becoming an increasingly popular career path for many scientists as the basic science fields of chemistry and biology intertwine. As our department contains chemistry, biology, and physics divisions, it is uniquely suited to offer programs which are cross disciplinary. The proposed program in Biochemistry will offer students a strong foundation in both the biological and chemical sciences with opportunities to construct their degree program to best suit their needs.

Program Purpose: *Provide details on the intent of the program and its relation to other programs.*

The Biochemistry program was developed to meet the increasing demands on cross disciplinary programs in the basic sciences. This program will serve two main purposes: to prepare students for entrance into various health profession schools and to train students who wish to pursue a career in Biochemistry. While the BCPS department offers many degree programs, many of the cross disciplinary programs are excessively structured. One of the hallmarks of the new proposed Biochemistry program is the large number of free technical electives incorporated into the curriculum to allow students and advisors to construct a program to best serve the students needs while maintaining a required core curriculum utilized by many Biochemistry programs across the country.

Program Benefits: *State the impact of the program for students and for IIT.*

Most Biochemistry programs are offered at larger universities, and there are no Biochemistry programs offered by smaller schools in the Chicago area. However, information from our admissions department has indicated that many prospective students seek out Biochemistry programs due to their cross disciplinary nature. Therefore, the Biochemistry program at IIT should be able to attract students not only because of curriculum content but also due to small class size and the personal attention to students that results from smaller class size at IIT.

MARKETING INFORMATION

Competitive Programs: *Indicate other similar programs locally and nationally detail their success.*

Few institutions of equivalent size offer Biochemistry degree programs. However, the Biochemistry programs at larger universities are quite successful and attract numerous students.

Market Analysis: *Detail the results of any market analysis performed; if none, provide justification for the program including (potential) employment opportunities for graduates.*

Many of the Biochemistry programs throughout the country are utilized as 'pre-med' programs and attract a fair number of students. They also provide adequate training and preparation continuation into graduate school. However, a degree in Biochemistry may also provide a student with employment opportunities on an entry level basis at some larger pharmaceutical companies.

Marketing and Advertising: *List the strategies to be employed for the program.*

Most marketing and advertising efforts will be focused on the following:

- Advertise the degree program as part of the 'pre-health' brochure in development with the Admissions department
- Coordination with admissions recruitment officers to inform potential students of the availability of the degree program
- Advertisement of the degree program through the BCPS department web-page

ACADEMIC INFORMATION

Enrollment Estimates: *Provide estimates for initial enrollments (first three years) and for steady state including justification.*

The Biochemistry program will provide an alternative for students who are already applying to IIT as well as attracting new applicants. We expect that there will initially be 10 students in the program with a steady state of 20 or more per graduating class.

Retention Estimates: *Provide estimates for retention including justification.*

The proposed program will provide students already at IIT in pre-health majors with an alternative curriculum which features more free electives than the Biomedical Engineering or Molecular Biophysics and Biochemistry programs. This will help in retention of students who decide that these programs are too rigid for their interests.

Course Requirements: *Detail the courses needed for the program including courses currently offered, new courses to be developed, and dependence on courses from other academic units with their commitments to provide these courses on a long-range basis. Include descriptions of laboratories that will need to be developed along with equipment and facilities requirements.*

The following is a listing of the required curriculum for a bachelor of science in Biochemistry. Students will be allowed to choose between Chemistry 344 and Physics 223 depending on their academic purpose for enrollment into the program. Students who are planning to use this degree as a 'pre-health' program will be advised to enroll in physics 223 while students who are planning on pursuing a career in Biochemistry will be advised to enroll in chemistry 344.

<i>Biology Courses</i>		<i>Chemistry Courses</i>	
100 Intro to profession	2	124 Chemistry I	4
107 General Biology	3	125 Chemistry II	4
109 General Biology Lab	1	237 Organic I	4
115 Human Biology	3	239 Organic II	3
117 Experimental Biology	1	240 Organic II Lab	2
210 Microbiology	3	247 Analytical Chemistry	3
214 Genetics	3	343 Physical Chemistry I	3
445 Cell Biology	3	344 Physical Chemistry II	4
446 Cell Biology Lab	3	(or Physics 223)	
495 Colloquium	1	485 Colloquium	1
<i>Biochemistry Courses</i>		<i>Physics Courses</i>	
Biol/Chem 401 Biochemistry I	3	123 Physics I	4
Biol/Chem 402 Biochemistry II	3	221 Physics II	4
Biol 404 Biochemistry Lab	3	223 Physics III	4
		(or Chemistry 344)	
<i>Math Courses</i>		<i>General Education Requirements</i>	
MATH 151 Calculus I	5	CS 105 Computer Science	2
MATH 152 Calculus II	5	Humanities/Social Science	21
MATH 251 Vector Calculus	4	I PRO	6
BME 433 Biostatistics	3		
<i>Technical Electives (5)</i>	14-16	Total Credits	128-130

All of the courses listed are currently offered by the BCPS department or at IIT with the exception of Biology 401 and 402, the Biochemistry sequence. The BCPS department currently offers a one semester 4 credit Biochemistry course (403); however, the department has reached the conclusion that a two semester 6 credit sequence will more adequately cover topics in Biochemistry. Therefore, we propose to begin the two semester sequence in Fall 2007; course descriptions are found below. In order to make this change 'credit neutral' for many degree programs, the introductory laboratory courses (Biol 109 and Biol 117) will be changed from 2 credits to 1 credit each. During the first year of implementation, all three courses (401, 402, and 403) will be offered; afterwards, Biol 403 will no longer be offered. This program will rely on courses offered by other academic units in the same manner as other departmental majors, i.e. for math and general education courses; however, this degree program also lists BME 433 Biostatistics as a requirement. This course was included in the curriculum because it will be more relevant to our students than the standard probability and statistics courses currently offered (i.e. MATH 474) as it relates statistical analysis to experimental and clinical examples. We have notified the BME department of our inclusion of this course in our degree program and they have confirmed that this course will be provided on a long-term basis.

Biol 401: Biochemistry I (introductory biochemistry)

Covers the basic principle of biological chemistry, with particular focus on: proteins, nucleic acids, carbohydrates and lipids; their molecular structure, chemical reactions, and practical methods in characterization; enzymes and enzyme-catalyzed reactions.

Pre-requisites: Biol 107 or 115 and Chem 237

Biol 402: Biochemistry II (metabolic biochemistry)

Deals with the biochemistry of metabolism, focusing on: glycolysis, the citric acid cycle, and electron transport; synthesis and breakdown of biomolecules such as amino acids, nucleic acids, lipids, and carbohydrates; blood chemistry; lipid transportation; and metabolic control.

Pre-requisites: Biol 105 or 115 and Chem 237 and Biol 401

SAMPLE CURRICULUM /PROGRAM REQUIREMENTS

Provide below a sample curriculum and the program requirements, as they would appear in the IIT Undergraduate Programs bulletin or Graduate Programs bulletin as appropriate.

Sample Curriculum

Semester 1

Biol 100 Intro to Prof	2
Biol 107 Gen. Biology	3
Biol 109 Gen Biol Lab	1
Chem 124 Gen Chem I	4
Math 151 Calculus I	5
	15

Semester 2

Biol 115 Human Biology	3
Biol 117 Exp. Biology	1
Chem 125 Gen Chem II	4
Math 152 Calculus II	5
100 level Humanities	3
	16

Semester 3

Biol 214 Genetics	3
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Semester 4

Biol 210 Microbiology	3
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Chem 237 Organic I	4	Chem 239 Organic II	3
Phys 123 Physics I	4	Chem 240 Organic II Lab	2
Math 251 Vector Calc	4	Phys 221 Physics II	4
CS 105 Computer Prog	2	Hum/Soc Elective	3
	17		15

<i>Semester 5</i>		<i>Semester 6</i>	
Biol/Chem 401 Biochem I	3	Biol/Chem 402 Biochem II	3
Phys 223 Physics III	3-4	Biol 404 Biochem Lab	3
Or Technical Elective		BME 433 Biostatistics	3
Chem 247 Analytical Chem	3	Technical Elective	3
Technical Elective	3	Hum/Soc Elective	3
Hum/Soc Elective	3	I PRO 297	3
	15-16		18

<i>Semester 7</i>		<i>Semester 8</i>	
Biol 445 Cell biology	3	Chem 485 Colloquium	1
Biol 446 Cell Bio Lab	3	Chem 344 P Chem II	3-4
Biol 495 Colloquium	1	Or Technical Elective	
Chem 343 P Chem I	3	I PRO 497	3
Technical Elective	3	Hum/Soc Electives	6
Hum/Soc Elective	3	Technical Elective	3
	16		16-17

ECONOMIC ANALYSIS

On the attached spreadsheet, detail the revenues and expenses for the program; include course development, new faculty hires (both full-time and part-time), advertising costs, and staff and office costs.

We anticipate that this program will be relatively revenue neutral for the first three years of operation. Our enrollment numbers have dropped with the suspension of the dual BS/MD program with Rosalind-Franklin School of Medicine; therefore, we are hoping that this new program will recruit new students, in part to make up for the loss of enrollment generated by that program. Also, many students will elect the Biochemistry degree program in lieu of other degree programs in the department, although this is likely to be a minor shift. We currently employ sufficient qualified faculty to offer all courses proposed in this curriculum and do not anticipate the requirement of new faculty hires in the immediate future.