

NEW UNDERGRADUATE PROGRAM PROPOSAL

ILLINOIS INSTITUTE OF TECHNOLOGY

The following information is required by the Undergraduate Studies Committee to approve new programs. After approval by UGSC this form should be routed to Faculty Council for approval and then the Provost's office.

College(s): College of Science, and Lewis College of Human Sciences

Department(s): Biological Sciences, and Psychology

Date: 1 September 2018

Approvals Required

(1) Academic Unit Head(s):

Approved in Biology dept on 26 Oct 2017

Approved in Psychology dept on 1 June 2018

(2) Dean(s):

(3) Undergraduate Studies Chair:

GENERAL INFORMATION

Program Title: Dual Degree in Biochemistry and Psychological Science

Program Scheduling: *In what semester will students start to be admitted?* Fall 2018___

Total Program Credit Hours: *126 hours minimum* 144-157

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

This program provides an integrated dual degree program leading to the Bachelor of Science in Biochemistry and the Bachelor of Science in Psychological Science while maintaining the integrity and program content of each individual degree program. This is modeled after the successful introduction of a dual BS Biochemistry / BS in Psychological Science in 2016; since then we have had 3 students into this demanding program. 2 of these 3 expressed stronger interest in a BS Biochemistry than Biology. We now have one additional student interested only if the dual involved Biochemistry. This is a modest number, but this demanding dual degree attracts very good students and so has a beneficial effect in recruiting disproportionate to these small numbers – and as a dual constitutes entire of existing degrees, involved no extra expenses and so is viable and indeed beneficial with small numbers. Our first matriculant in that program is poised to graduate on schedule S19 and holds a GPA of 3.83 after 94 hrs.

Each program's requirements are fully met, and the requirements are identical to BS biochemistry and BS Psychological Science, with following exceptions for integration points:

1. selection of two Biology classes, (one core, one Biochemistry technical elective) to count as Psychology technical electives
2. selection of two Psychology core classes to count as Biochemistry technical electives
3. utilization of a Psychology experimental research methods course (4 CR) as one of the two mandated upper level Biology laboratory classes (3 CR) and colloquium classes (1 CR)

Courses in 1 and 2 have been reviewed by both departments as being appropriate as electives within the opposite discipline. With this integration, a program of 144-157 c.h. is presented, which is 22-31 CR more than the 126 CR in Biochemistry or Psychological Science BS programs, and thus >15 c.h. in addition to either degree alone, as required for a dual degree program.

With 144 minimum c.h., this program is achievable in 4 years (8 semesters) at the standard a maximum load of 18 c.h. As a dual degree program, this is not exceptional. Many high-achieving students that are the intended audience for this program enter IIT with significant AP or transfer credit, which will allow a 4-year program; and these students sometimes take overload schedule with > 18 ch. How advisable this is will depend on the specifics of each student and will be dealt within the advising process. Alternatively, for students with no AP, a 9-semester schedule may be more advisable, or summer classes may be used to complete the program in 4 years.

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

This program has two main target audiences:

1. Pre-health students (pre-MD, pre-clinical psychologist or psychiatrist) who are interested in neurological or behavioral issues. A challenging double major program will be an asset in professional school application process, and this degree will provide excellent preparation for the MCAT etc.
2. Students interested in moving on to graduate school in studies at the interface of biochemistry and psychology, such as neuroscience, brain science, or cognitive science.

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

This program provides an integrated approach to achieved two degrees in two related by distinct areas, Biochemistry and Psychology. The advantage of this dual degree program over simply taking the two degrees separately is that by integration a total of 21 c.h. are saved. Allowing both degrees to be achieved in 4 or 4.5 years, as opposed to 5.5 or 6. These integration points have been carefully considered by the two department to provide maximum benefit to the student in integrating these degrees by guiding students to classes at the interface of these two disciplines.

This program will be particularly attractive to students interested in the health professions. Approximately 50% of all medical school applicants and matriculates major in the Biological Sciences with Biochemistry one the top majors within this cohort. Another 10% of all applicants and matriculates major in the Social Sciences, where Psychology majors are counted. In light of recent changes in the MCAT examination and admissions standards, students who earn a dual degree in Biochemistry and Psychological Science will be better prepared for entrance examination and have a more diversified portfolio to enhance their competitiveness in the application process.

In addition to medical school, students who graduate from this program will be competitive applicants for students interested in a Masters of Public Health and Genetic Counseling programs who seek candidates with degrees in Biology, Chemistry, Psychology, Social Work or related fields. It is also a demanding dual major that is attractive to good students and excellent preparation to advances work at the interface of Biology, Biochemistry, Psychology, Neuroscience, Brain science and cognition.

In the past 10 years, 3 students have completed the degree requirements for both the Bachelor of Science in Biology and the Bachelor of Science in Psychological Science. In addition to those, approximately 20 students in each discipline have completed a minor in the other discipline. By creating the dual degree, we increase the likelihood of students who can complete both degree programs in a reasonable time frame, and increase their competitiveness for application to professional schools.

The benefit to IIT is that as an ambitious double major, this program is likely to be attractive to highly desirable very qualified and ambitious students. By providing an integrated path to both degrees we expect to have an advantage over other schools that may offer each degree separately. These students are likely to go on to careers in the medical fields or go onto post graduate degrees in the sciences, and become highly desirable alumni. This program feeds into a well-defined and well compensated career path, and so students and families are more likely to accept student debt

Classification of Instructional Programs (CIP) Code : N/A

No CIP code exists for the dual degree; however, because students are obtaining both a BS in Biology and a BS in Psychological Science, either CIP code for those degree programs may be utilized.

BS in Biochemistry: 26.0202

BS in Psychological Science, Research and Experimental Psychology, Other: 42.2799

Required to make the program US Financial Aid Eligible - The CIP code takes the following structure: xx.xxxx Where each x is a number between 0 and 9. This 6-digit code identifies, to the greatest specificity possible, an entire instructional program. The classification scheme seeks to comprehensively address all areas of study. Because of the dynamic nature of education, however, new CIP codes are frequently added to the list. The first 2-digits are the first cut off of detail and describe the general discipline of the program. For example, any program with a CIP that starts with 14 is within the Engineering discipline; anything with a 22 is within the legal discipline. The next 2 digits increase the level of detail, and the final 2-digits provide the highest level of detail.

Find CIP codes at <http://nces.ed.gov/ipeds/cipcode>

PROGRAM VIABILITY

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

Integrated dual degree programs are rare. This is good, as it provides IIT with competitive advantage. We have identified one integrated dual Biology/Psychology program:

Carnegie Mellon University

[Unified Double Major in Psychology & Biological Sciences](#)

This program is a double major that provides one degree, BS in "Biol and Psych" or BS in "Psych and Biol" (depending on home college of the student) since it does not require c.h. in excess of a simple BS degree at CMU. It is hosted in Psychology but utilizes many Biology courses. Our proposal herein describes a dual degree with two degrees conferred with extra c.h. earned.

Many programs between Biology and Psychology exist that provide a mechanism for interdisciplinary study, but no unification of degrees:

University of Denver Departments of Biological Sciences or Psychology

[Concentration in Cognitive Neuroscience](#)

Option C - Biology/Psychology Double Major

This appears to be a double major but with no integrations. Both Biology and Psychology offer degrees with specialization in "Cognitive Neuroscience". This seems to be a cooperative program, but there does not appear to be any special unification for double majors.

Some schools offer distinct degrees not in Biology or Psychology, but in for instance, BioPsychology or Neural science. These are interfacial programs between biology and psychology that provide one, specialized degree. Typically they have significant enough overlap that double majoring in one of the 'home' disciplines is prohibited.

Tufts

[Biopsychology](#)

students may not double major with biology or psychology.

New York University

[Degree in Neural Science](#)

Can double major in Psych, but cannot with biology

Market Analysis for Recruiting Students: *Detail what work has been done with UG Admissions to identify and recruit potential students.*

Admissions will market this program to students who express an interest in Biochemistry, Psychology, neuroscience, or pre-medicine based on inquiries to IIT or via procured names from testing sources. Both Biology (#4), of which Biochemistry is a subdiscipline, and Psychology (#2) are among the top 5 majors nationwide.

<http://college.usatoday.com/2014/10/26/same-as-it-ever-was-top-10-most-popular-college-majors/>

In addition, Loyola University Chicago as just released a new neuroscience undergraduate major that they announced has already been declared by 242 undergraduates, indicating a strong market for this type of program and competition.

The focus on Biochemistry instead of Biology may seem to reduce these numbers as Biochemistry is not a top-10 major as Biology is. However, since the introduction of IIT's dual in BS-biology BS-psychology on 2016, we have had 3 students, 2 of which initially wanted biochemistry instead of biology, and we now have one additional student interested who is already majoring in Biochemistry and is only interested in the dual if offered with Biochemistry, and not in Biology. It seems the rigorous nature of the BS biochemistry with additional math and chemistry requirements is attractive to this good student cohort.

Market Analysis for Graduates: *Detail what work has been done with the Career Management Center to identify potential employment opportunities for graduates.*

Graduates with a dual degree in Biochemistry and Psychology will be highly competitive for health professions school admissions and graduate school admission. A brief review of the literature suggests that the intersection of the academic disciplines will offer opportunities as the careers which seek to address complex problems require an approach that is both inter- and multidisciplinary. We will continue to work with CMC to develop opportunities for our graduates.

ACADEMIC INFORMATION

Enrollment Estimates: *Are there enrollment estimates for this program, and if so, what are they and what are they based on? What is the minimum number of students necessary in the program to make the program viable (i.e. to offer classes unique to the program often enough)?*

OII has provided the following historical data. Admit numbers are significantly higher than matriculants, and this premium program is projected capture a few of those. We estimate 1-2 per year once the program is running

	Admits			Matriculants		
	Biochemistry	Psychology	Grand Total	Biochemistry	Psychology	Grand Total
Fall 2013	34	32	66	9	12	21
Fall 2014	34	41	75	5	14	19
Fall 2015	35	29	64	6	11	17
Fall 2016	49	23	72	6	4	10

Given there are no classes unique to the program, a minimum number of students are not required to make the program viable. However, we anticipate 4-6 students will be enrolled based on current enrollment numbers for the two departments and student interest in majoring in one and minoring in the other subject as well as expressed interest of current students in a dual degree program. Currently in its second year the dual BS Biology/BS Psychological Science has 3 students with a 4th interested. It is likely that the dual with biochemistry will cannibalize some of the interest in the biology dual.

Advising Strategy: *Since quality advising is a key component of good retention, graduation and career placement, how will students be advised and mentored? Specifically for interdisciplinary programs, how will advising responsibilities be shared? What student professional organizations will be formed? How will the department work with the Career Management Center to develop industry connections?*

Both the departments of Biology (home of BS Biochemistry) and Psychology will be responsible for advising of the dual degree students. They will be assigned an advisor from each department and will meet with them on a regular basis and communication will be shared between all parties. In addition, advisors in both departments will track these students in comparison to students in the individual majors to ensure that students in this program are meeting the benchmarks expected of students in the individual majors.

Both departments will continue working with the CMC to develop opportunities for our graduates.

Course Requirements: *Detail the courses needed for the program including courses currently offered, new courses to be developed (including syllabi), 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 program is defined as the union of the requirements of BS Biochemistry and BS Psychological Science, with the following exceptions as integration points:

1. One of Psychology or Biology ITP is required, (PSYC 100 or BIOL 100), either will be accepted.
2. Either MATH 425 or PSYC 203 will satisfy the statistics requirement
3. One free 4xx level Biology Laboratory (3 credits) and one Colloquium (1 credit) will be replaced by PSYC 420 Research Methods in Behavioral Science (4 credits)
4. Two Biology electives will be replaced by two Psychology courses (414-Neurological Basis of Behavior and 426-Cognitive processes)
5. Two Psychology electives will be replaced by two Biology courses (214-Genetics) and one chosen from a list of Psychology-approved Biology electives {BIO430-Human Physiology; BIO475 Global health, FST401 Nutrition, BIO420 Neurology}
6. Up to three Psychology electives may be applied to the human sciences module of the IIT core curriculum, so long as all IIT core rules ensuring breadth and level are still satisfied.

All courses are currently being offered on a regular basis to satisfy the demands of each academic unit's individual majors. Courses in 4 and 5 have been reviewed by both departments as appropriate as technical electives for the corresponding degree.

Required courses	Credit Hours
ITP	
BIOL100 or PSYC100	2-3
Biology Requirements	
BIOL 107, 109, 115, 117, 210, 214, 401, 402, 404, 445, 451, 495 (or CHEM 485)	28-29
Technical electives	2-3
Dual degree eligible one of {BIO 420, 430, 475, or FST401}	3
Chemistry Requirements	
CHEM 124, 125, 237, 239, 247, 240, 343, 438 (or 344), CHEM 485 (or BIOL495)	26-28
Physics Requirements	
PHYS 123, 221	8
Mathematics Requirements	
MATH 151, 152, 251, 425 (or PSYC 203)	17-18
Psychology Requirements	
PSYC 221, 204, 301 or 303, 310, 320 or 409, 414, 435 or 436, 312 or 423 or 426, 485	28
Psychology electives	9*
Computer Science Requirements	
CS105 or CS110	2
I PRO	6
Humanities and Social Science Requirement	12-21*
Humanities (H) 200 + two H 300+	9
Social Sciences (S) 200 + two S 300+	3-9*
H/S	0-3*
Total Hours	144-157

**Students may choose to apply a maximum of three Psychology courses to both the Social Sciences requirements and the Psychology electives specified for the Psychology requirements (Psychology electives must be 300+). At least one of the Social Science (S) courses must be a non-Psychology course.*

Sample Curriculum/Program Requirements: Provide a sample semester by semester curriculum and the program requirements, as they would appear in the IIT Undergraduate Programs bulletin.

The program has a range of 144-157 ch, so is achievable in 4 to 4.5 years of full time study at the standard maximum load (≤ 18 ch). As such, we have presented a 9-semester sample schedule as well as an 8-semester high -load schedule. It is anticipated that some students will achieve the program in 4 years (8 semesters):

- This dual degree program is expected to attract high achieving students that
 - tend to enter IIT with significant AP and transfer credit
 - often take a maximal 18 ch load, or overload of 19-21 ch occasionally
- Alternatively, by use of summer classes, a 4-year program may be feasible for some students

8 semesters at high load

Semester 1			Semester 2		
		Credits			Credits
BIOL 100	Introduction to the Profession	2	BIOL 115	Human Biology	3
BIOL 107	General Biology	3	BIOL 117	Human Bio Lab	1
BIOL 109	Gen Bio Lab	1	PSYC 301	Abnormal or Industrial Psychology	3
PSYC 221	Introduction to Psychological Science	3	CHEM 125	Principles of Chemistry II	4
CHEM 124	Principles of Chemistry I	4	PHYS 123	Physics 1	4
MATH 151	Calculus I	5	HUM 2xx	Humanities Elective	3
		18			18
Semester 3			Semester 4		
		Credits			Credits
BIOL 214	Genetics	3	BIOL 210	Microbiology	3
PSYC 310	Social Psychology	3	PHYS 221	Physics 2	4
CHEM 237	Organic Chemistry I	4	PSYC 204	Res Meth Behav Sci	4
MATH 152	Calculus II	5	MATH 251	Multivariate and Vector Calculus	4
H 3xx	Humanities Elective	3	S	Social Sciences Elective (See note* below)	3
		18			18
Semester 5			Semester 6		
		Credits			Credits
PSYC 320	Applied Correlation & Regression	3	BIOL elec		2
BIOL 445	Cell Biology	3	PSYC 435	Child Development	3
PSYC 414	Neural & Biological Bases of Behavior	3	CHEM239	Organic Chemistry II	3
S/H	Social Sciences Elective (See note* below)	3	CHEM240	Organic Chemistry II Lab	2
I PRO	I PRO	3	I PRO	I PRO	3
Chem 247	Analytical Chemistry	3	CS 105		2
		18	MATH 425	Statistical Methods	3
		18			18
Semester 7			Semester 8		
		Credits			Credits
BIOL 401	Introductory Biochemistry	3	BIOL 402	Metabolic Biochemistry	3
PSYC 426	Cognitive Science	3	BIOL 451	Literature in Biology	2
BIOL 404	Biochem Lab	3	CHEM438	Physical Biochem	3
S	Social Sciences Elective (See note* below)	3	PSYC 485	Psychology Capstone	3
CHEM 343	Pchem 1	3	S	Social Sciences Elective (See note* below)	3
H 3xx	Humanities Elective	3	dual degree	Biology elective	3
		18	BIOL495	Colloquium	1
		18			18

*Students may choose to apply a maximum of three Psychology courses to both the Social Sciences requirements and the Psychology electives specified for the Psychology requirements (Psychology electives must be 300+). At least one of the Social Science (S) courses must be a non-Psychology course.

TOTAL 144

9 semesters at typical load

Semester 1		Credits	Semester 2		Credits
BIOL 100	Introduction to the Profession	2	BIOL 115	Human Biology	3
BIOL 107	General Biology	3	BIOL 117	Human Bio Lab	1
PSYC 221	Introduction to Psychological Science	3	PSYC 303	Abnormal Psychology	3
CHEM 124	Principles of Chemistry I	4	CHEM 125	Principles of Chemistry II	4
MATH 151	Calculus I	5	PHYS 123	Physics 1	4
		17			15
Semester 3		Credits	Semester 4		Credits
BIOL 214	Genetics	3	BIOL 210	Microbiology	3
PSYC203	Undergraduate Statistics for Behavioral Sciences	4	PHYS 221	Physics 2	4
HUM 2xx	Humanities Elective	3	PSYC 204	Res Meth Behav Sci	4
MATH 152	Calculus 2	5	H/S	Social Science Elective (See note* below)	3
BIOL109	General Biology Laboratory	1			
		16			14
Semester 5		Credits	Semester 6		Credits
CHEM 237	Organic Chemistry I	4	dual degree	Biology elective	3
PSYC 414	Neural & Biological Bases of Behavior	3	PSYC 435	Child Development	3
PSYC 320	Applied Correlation & Regression	3	CHEM239	Organic Chemistry 2	3
I PRO		3	Chem240	Organic Chemistry 2 Lab	2
MATH 251	Multivariate and Vector Calculus	4	PSYC 310	Social Psychology	3
		17	BIOL elec		2
					16
Semester 7		Credits	Semester 8		Credits
BIOL 401	Introductory Biochemistry	3	BIOL 402	Metabolic Biochemistry	3
PSYC 426	(Cognitive Science	3	BIOL 451	Literature in Biology	2
S	Social Sciences Elective (See note* below)	3	CHEM438	Physical Biochem	3
CS 105		2	I PRO		3
CHEM 343	Physical Chemistry I	3	H 3xx		3
Chem247	Analytical Chemistry	3	S	Social Sciences Elective (See note* below)	3
		17			17
Semester 9		Credits	TOTAL		Credits
H 3xx		3			145
BIOL 445	Cell Biology	3			
BIOL 404	Biochem Lab	3			
BIO495	Colloquium	1			
PSYC 485	Psychology Capstone	3			
S	Social Sciences Elective (See note* below)	3			
		16			

*Students may choose to apply a maximum of three Psychology courses to both the Social Sciences requirements and the Psychology electives specified for the Psychology requirements (Psychology electives must be 300+). At least one of the Social Science (S) courses must be a non-Psychology course.

Program Outcomes and Assessment Process: *Provide the program learning goals and assessment plan (for more information contact the Assessment Office within Academic Affairs). Also see <https://sites.google.com/a/iit.edu/student-learning-assessment/>*

Program learning goals and desired outcomes for each degree within the dual degree are identical to the those of the individual degrees, and are done by both departments in the course of normal assessment activities for those programs.