Fiscal Unit/Academic Org	Biochemistry - D0310
Administering College/Academic Group	Arts And Sciences
Co-adminstering College/Academic Group	
Semester Conversion Designation	Converted with minimal changes to program goals and/or curricular requirements (e.g., sub-plan/specialization name changes, changes in electives and/or prerequisites, minimal changes in overall structure of program, minimal or no changes in program goals or content)
Current Program/Plan Name	Biochemistry
Proposed Program/Plan Name	Biochemistry
Program/Plan Code Abbreviation	BIOCHEM-BS
Current Degree Title	Bachelor of Science

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		180	120.0	120	0.0
Required credit hours offered by the unit	Minimum				
	Maximum	26	17.3	19	
Required credit hours offered outside of the unit	Minimum				
	Maximum	33	22.0	24	
Required prerequisite credit hours not included above	Minimum				
	Maximum	55	36.7	38	

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

Program Learning Goals

- 1.1 Demonstrate an understanding of Mendelian, molecular, and population genetics, as well as molecular biology

  1.2 Discuss evolution, ecology, and organismal biology as a biochemical processess
- 2.1 Understand the chemical, mathematical, and physical concepts required to describe biological processes.

  2.2 Explain biochemical processes using the relevant chemical, mathematical, and physical concepts, including thermodynamics and kinetics.
- 2.2 Identify and reproduce the structures of biological molecules such as polypeptides, nucleic acids, carbohydrates,

  2.3 Explain how macromolecular structure and dynamics determine biological function of a biomolecule or biomolecular complex
- 2.4 Describe the relative merits of various methods to determine molecular structure and dynamics.

  2.5 Illustrate an understanding of enzyme mechanisms and enzyme function, including the ability to utilize Michaelis-Menten kinetics.
- 3.1 Describe how enzymes and other biological molecules interact in metabolic pathways to carry out dynamic chemical changes in cells, including an understanding of feedback loops and energy flow, and how these relate to metabolic disorders.
- 3.2 Describe the regulation and control of gene expression, DNA repair, and DNA replication.
- 4.1 Demonstrate an understanding of the scientific method as it applies to the design of experiments and analysis of outcomes.

  4.2 Conduct standard biochemical experiments in the laboratory and draw conclusions from experimental data.
- 4.3 Design appropriate experimental approaches to a biochemical problem using the theoretical basis for common laboratory experiments and procedures.
- 4.4 Communicate scientific concepts clearly and concisely, orally and in writing, including knowledge of scientific writing and presentation styles.

  4.5 Understand the relationship of the major area to broader areas of science.
- 4.6 Interpret research seminars and articles from the current literature to demonstrate broader comprehension of research methods in Biochemistry.

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes

Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? Yes

Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar.

The assessment plan for the Biochemistry major consists of a combination of embedded testing, laboratory reports, colloquium evaluations, Senior thesis (Honors), syllabus review, ASC Senior surveys, and student evaluation of instruction (SEI) for all courses.

The assessment process was evaluated during the summer of 2009 by the NMS Division of the College of Arts and Sciences (report is on file). Although the review panel found aspects for improvement, the report stated, “In almost all cases, the minimal criteria for the goals and objectives were met and often exceeded. A highlight of student achievement was the extensive participation by biochemistry students in undergraduate research.”

The assessment methods utilized for each learning outcome and associated course(s) were evaluated during that review. A brief summary of the assessment procedures is provided in a table included in Appendix A.

These data are regularly used for curriculum development and to modify course content as needed as well as to establish trends over time and among instructors and as part of annual faculty/instructor review of course delivery and effectiveness of instruction.

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Pre-Major

Does this Program have a Pre-Major? No

Attachments

- Biochemistry Program Request Proposal Additional Information with Appendicies.pdf: Program Request-Additional Information/Appendicies

(Program Proposal. Owner: Swenson,Richard Paul)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Swenson,Richard Paul	11/03/2010 01:37 PM	Submitted for Approval
Pending Approval	Swenson,Richard Paul	11/03/2010 01:37 PM	Unit Approval

GENERAL PROGRAM INFORMATION

Items 1-9 included Program Request Form.

PROGRAM REQUIREMENTS

10. Program Learning Goals (i.e., knowledge, skills, and attitudes / perspectives) to be attained by students at time of completion of the program.

Included on Program Request Form but see also ***Appendix A*** for courses that are designed to fulfill each learning outcome and the assessment method used in each case.

11. List of semester courses (department, title, credit hours) and categories of courses that constitute the requirements of the program.

See ***Appendix B*** for a Curriculum Map listing the proposed semester courses along with their quarter equivalents and conversion information.

The Biochemistry Major (BA):

The BA student should complete all BS major requirements with the following exceptions:

BA Substitutions:	*Instead of BS Requirements*:
Chemistry x251, x245, x246	Chemistry x251, x252, x254, x255
Biochemistry 5721 or Chemistry x520	Biochemistry 5721 and 5722 or Chemistry x530 and x531 or

12. Program Rationale.

The Biochemistry major was thoroughly evaluated in 2007 as part of an internal departmental review. The overall conclusion that was reached was that the structure of the major was serving our students well. This conclusion was supported by the Colleges of the Arts and Sciences-instituted exit survey of graduating students in 2006 which indicated that the majority of the students responding were satisfied with the Biochemistry coursework and quality of instruction. The structure of the major is built on a solid foundation of prerequisite courses in the physical and biological sciences and mathematics followed by a set of core courses that delve into the molecular biosciences in greater detail while providing the chemical and mathematical tools that are critical to the field of biochemistry. These prerequisite courses along with organic chemistry and advanced calculus are typically completed within the first two years of the program. Students then generally begin their core biochemistry courses during their third year. This basic structure will be retained in the semester system.

However, over the course of the past 5+ years, considerable time and effort has been devoted to updating the required courses in the biochemistry major, spurred largely by the efforts of new faculty in the department. The laboratory course, Biochemistry 521 (semester-5621), has been extensively modified to include contemporary techniques and more of a research emphasis. The Biochemistry series, 721.01-721.02-721.03 (semester-5721 and 5722) covering modern physical biochemistry have been infused with the theory and practical aspects of physical techniques for macromolecular structure determination. Finally, the year-long survey course, Biochemistry 613-614-615, (semester-5613, 5614-5615) has been revised extensively to reflect recent advances in the molecular life sciences. The general course content,

while adequate, has been determined to be under-emphasizing many of the new discoveries in the rapidly expanding of the life sciences. This issue will be addressed below. Our overall rationale for the semester conversion process is as follows.

Direct conversions: The basic core of the curriculum was left largely unaltered during the conversion to the semester format. Most of the prerequisites, non-departmental and departmental core course will be converted directly following the 2/3 conversion process. Many of the perquisites are currently three-quarter series and these will straightforwardly transition into a two-semester series format. It is presumed that content will remain largely as is within this format. This will be the case for the department's "Physical Biochemistry" series (5721 and 5722 in the semester system). These courses will all likely be taught in a 3-session/week, 55-min/session format. Alternatively, the 2-session/week, 80-min format may be implemented.

Upgraded conversion: After extensive evaluations, peer-institution comparisons, and faculty discussions, the decision was made expand the department's core three-quarter biochemistry series (Biochemistry 613-614-615) to a three-semester series rather than retain a two-semester format. Our rationale is as follows. The field is rapidly expanding with new concepts added regularly through the massive efforts in research world-wide. This is especially true in the area of gene expression and regulation, RNA biochemistry, structure, and processing. To better prepare our students, especially those who plan to enter professional or graduate school, this new material must be included. This expansion brings the department's core biochemistry curriculum more in line with our peer institutions that typically offer such three-semester series. Furthermore, the direct conversion of this three-quarter series to two semesters would have required the redistribution of course content in an inefficient manner. Metabolism, which is currently covered in Biochemistry 614 would likely have had to be split between two quarters, outcome that was believed to be unacceptable. Continuity within the subject area is essential for the natural re-enforcement of central concepts with subareas and for retention. Also, the inclusion of a portion of metabolism in the second semester course of these series would significantly impair the proposed expansion of the subject areas discuss above.

Expanding the 613-614-615 quarter series to three semesters will require some changes in the manner in which our students move through the required core curriculum for the Biochemistry major. The principal issue is the smaller "margin of error" resulting from the 1.5 *versus* one year schedule. Students who might fail the first course in this series could lose substantial time in their course towards graduation. To minimize this potential problem, 5613 with be taught during Spring Semester. Students will be advised to enroll in this course during their second (Sophomore) year followed by 6514 and 5615in the Autumn and Spring, respectively, of their third (Junior) year. With this schedule, students will be taking the final organic chemistry along with 5613. The course content of 5613 will be adjusted to accommodate a potential lag in acquiring some of the basic organic chemistry concepts required for that course. Finally, having our students begin their biochemistry earlier in their studies will assist efforts by the Department to foster an intellectual community of Biochemistry students and to more quickly identify students who may benefit from independent study and/or basic research to augment their education. Under the current system, students typically have difficulties identifying and relating well to faculty who may foster their interests in this discipline.

13. Quarters curriculum advising sheet of requirements for the program.

See ***Appendix C*** **f**or the current advising form and a 4-year schedule under the quarter system.

14. Semesters curriculum advising sheet of requirements for the program,

Because there have not been any changes to the program requirements, the current advising form can easily be altered by changing the course numbers of the converted courses. Alternatively, a new advising form may be developed. A tentative 4-year schedule under the semester system can be bound in ***Appendix D.***

15. Curricular Map.

See ***Appendix B***

16. Will this program have an associated pre-major or area of interest?

Not applicable

CREDIT HOUR EXPLANATION

17. Table of credit hour changes.

See Program Request Form. This information is also included in ***Appendix B***

18. Rationale for the change in credit hours.

The conversion plans will tentatively lead to a slight increase of five semester units for the combined prerequisite and non-departmental and departmental core curricula. An increase of two units in the department's core biochemistry curriculum primarily results from the advantageous expansion of our 561x series (see justification in part #12 above). The other three units are distributed in the prerequisites and non-departmental core courses, over which this department has little control. The program may be altered in the future to reduce this issue. One of the recommendations that was made during our curriculum review in 2007 was to eliminate the analytical chemistry course requirement (Chemistry x221) and include the instruction of quantitative methods from a more biological perspective within our required biochemistry laboratory course (5621). The expansion from 10 to 14 weeks would allow sufficient time to incorporate this new material. The justification for this change is also supported by graduating student exit surveys which clearly indicate that many students take the analytical chemistry course late in their final year and often after the biochemistry laboratory course. Many students comment on the lack of relevancy of the chemistry course. Should the faculty decide to make this change, the total number of semester units would be reduced by five units.

TRANSITION POLICY

19. Transition policy statement.

The transition planning by the faculty was conducted in the context of the requirement that the conversion from quarters to semesters would not delay graduate or disrupt progress towards a degree. Most of the course conversions to the core curriculum should have minimal impact on the student's progress. For example, the conversion of the three-quarter Physical Biochemistry series (Biochemistry 721.0x) to a two-semester plan should be seamless. However, the proposed expansion of the three-quarter Biochemistry

61x to a three-semester plan will have scheduling consequences. This transition has been discussed extensively. The transition strategy can be summarized as follows:

Current Seniors (AY 10/11): No issues, should have already completed 61x series or can do so under the current quarter system.

Current Juniors (AY 10/11): Again, should be few issues, should be able to complete series under quarter system in next two years.

Current Sophomores (AY 10/11): Should be able to complete series next year (as juniors) under the quarter system and will be strongly advised to make plans to do so by their academic advisors. Student who should fail 613, which is currently offered only in the Autumn Quarter, will have the opportunity to retake a special "bridge" offering of this course during the spring of 2012. These students would then continue the semester versions of 614 and 614 (*i.e.* 5614 and 5615) during their senior year.

Current Freshmen (AY 10/11): This group could begin the 561x series under the semester system in their junior and senior years. They shouldn't encounter transition issues with Chemistry, Mathematics, and Physics prerequisites as these should be completed under the quarter system in the next two years. However, this group of students will be strongly encouraged to begin this core Biochemistry series in their sophomore year by taking the extra special "bridge" quarter version of 613 that will be offered in the Spring of 2012. They could then continue with semester versions of 614 and 615 (*i.e.* 5614 and 5615) during their junior year. This scenario will generate similar problems with Organic Chemistry. This group will need to be advised accordingly. See ***Appendix E*** for a tentative 4-year transitional schedule for this group of students.

Entering Freshmen for AY 11/12: This group could follow the prescribed semester plan for all Biochemistry course requirements, starting the 5613 in their sophomore year. However, they may encounter transition issues with Chemistry, Mathematics, and Physics prerequisites which will begin under the quarter system (for one year). Students will need to be advised individually regarding these courses. See ***Appendix F*** for a tentative 4-year transitional schedule for this group of students.

Entering Freshmen for AY 12/13: Will begin under the semester system with no transition issues. The expectation is that they will begin the core Biochemistry series (as 5613) in the Spring of their sophomore year and proceed to the second and third courses of this series, 5614 and 5615, during the Autumn and Spring Semesters, respectively, of their junior year. Students will normally have three full years in which to complete this three-semester series but, again, will be strongly encouraged to begin the series in their sophomore year to provide a one-year "buffer" to accommodate potential delays in an individual's academic progress. See ***Appendix D*** for a tentative 4-year schedule under a complete semester system.

ASSESSMENT CONVERSION

20. Is this a degree program (undergraduate, graduate, or professional) or major? Yes

The assessment plan for the Biochemistry major consists of a combination of embedded testing, laboratory reports, colloquium evaluations, Senior thesis (Honors), syllabus review, ASC Senior surveys, and student evaluation of instruction (SEI) for all courses.

The assessment process was evaluated during the summer of 2009 by the NMS Division of the College of Arts and Sciences (report is on file). Although the review panel found aspects for improvement, the report stated, "In almost all cases, the minimal criteria for the goals and objectives were met and often exceeded. A highlight of student achievement was the extensive participation by biochemistry students in undergraduate research."

The assessment methods utilized for each learning outcome and associated course(s) were evaluated during that review. A brief summary of the assessment procedures is provided in a table included in ***Appendix A***.

These data are regularly used for curriculum development and to modify course content as needed as well as to establish trends over time and among instructors and as part of annual faculty/instructor review of course delivery and effectiveness of instruction.

ATTACHMENTS

21. Letter from program-offering unit.

See ***Appendix G***

22. Letter from the college to the Office of Academic Affairs:

[to be attached at a later date]

23. Co-administering letter:

Not applicable

24. Support / concurrence letters:

Not applicable

25. Additional documentation for Ohio Board of Regents review:

Not applicable as this is not a new or substantially modified program.

Appendix A: Learning outcomes - Biochemistry major

1. Understand the relationship of biochemistry to broader areas of science		
	Fulfilled by:	Assessment method
1.1 Demonstrate an understanding of Mendelian, molecular, and population genetics, as well as molecular biology	Biology 1113 (or H1115); MolGen 4500	Syllabus review; instructor feedback
1.2 Discuss evolution, ecology, and organismal biology as a broader context for biochemical	Biology 1113, 1114 (or H1115, H1116), MolGen 4500	Syllabus review; instructor feedback
2. Apply chemical, mathematical, and physical concepts to describe biological processes		
2.1 Understand the chemical, mathematical, and physical concepts required to describe biological processes	Chem x121-x123, x251-x253; Math 1151.01 & 1152.01; Physics 1250 &1251; Biochem 5613	Syllabus analysis; instructor feedback; faculty questionnaire; embedded quiz in Biochem 5613
2.2 Explain biochemical processes using the relevant chemical, mathematical, and physical concepts, including thermodynamics and kinetics	Biochemistry 5721 and 5722	Embedded questions
2.2 Identify and reproduce the structures of biological molecules such as polypeptides, nucleic acids, carbohydrates, and lipids	Biology 1113 or H1115; in-depth in Biochemistry 5613-5615 and 4511	Syllabus review; embedded questions
2.3 Explain how macromolecular structure and dynamics determine biological function of a biomolecule or biomolecular complex	Biochemistry 5613-5615, 5721 and 5722	Embedded questions
2.4 Describe the relative merits of various methods to determine molecular structure and dynamics	Biochemistry 5613-5615, 5721 and 5722	Embedded questions
2.5 Illustrate an understanding of enzyme mechanisms and enzyme function, including the ability to utilize Michaelis-Menten kinetics to describe enzymatic activity	Biochemistry 4511, 5613-5615, 5721	Embedded questions
3. Apply biochemical concepts to explain basic cellular processes		
3.1 Describe how enzymes and other biological molecules interact in metabolic pathways to carry out dynamic chemical changes in cells, including an understanding of feedback loops and energy flow, and how these relate to metabolic disorders	Biology 1113 or H1115; in-depth in Biochemistry 4511, 5614	Embedded questions
3.2 Describe the regulation and control of gene expression, DNA repair, and DNA replication	Biology 1113; reinforced in MolGen 4500, Biochem 5615	Embedded questions
4. Use scientifically valid reasoning to investigate and articulate how biochemical knowledge is acquired		
4.1 Demonstrate an understanding of the scientific method as it applies to the design of experiments and analysis of outcomes	Lab components of chemistry courses; Biochemistry 5621, 6850, research courses	Laboratory reports, colloquium evaluations

4.2 Conduct standard chemical and biochemical experiments in the laboratory and draw conclusions from experimental data	Lab components of chemistry courses; Biochemistry 5621; research courses	Laboratory reports; colloquium evaluations
4.3 Design appropriate experimental approaches to a biochemical problem using the theoretical basis for common laboratory experiments and procedures	All courses, particularly Biochemistry 5621, 5721 and 5722	Syllabus review; exams
4.4 Communicate scientific concepts clearly and concisely, orally and in writing, including knowledge of scientific writing and presentation styles.	Required lab courses; writing assignments (e.g. Biochem 5614 and 5615)	Colloquium evaluations; ASC Senior survey
4.5 Understand the relationship of the major area to broader areas of science.	All courses	Colloquium evaluations; ASC Senior survey
4.6 Interpret research seminars and articles from the current literature to demonstrate broader comprehension of research methods in Biochemistry.	Biochem 5615 (writing assignment), Biochem 6850; research courses	Colloquium evaluations

Appendix B_ Biochemistry BS Major - Conversion to Semesters (*version 10/25/2010*)

Segment of major program	Quarter course #	Quarter course name	Current Qtr Credit hours	Semester course #	Semester course name	Proposed Semester Units	Calculated Direct 2/3 Conversion	Change in Credit Hrs
Prerequisites (some may double-count in GEC)	Biology 113/H113	Introductory Biology I	5	Biology 1113	Introductory Biology I	4		
	Biology 114/H114	Introductory Biology II	5	Biology 1114	Introductory Biology II	4		
	Chemistry 121	General Chemistry I	5					
	Chemistry 122	General Chemistry II	5	Chemistry x121	General Chemistry I	5		
	Chemistry 123	General Chemistry III	5	Chemistry x122	General Chemistry II	5		
	Mathematics 151	Calculus and Analytic Geometry I	5					
	Mathematics 152	Calculus and Analytic Geometry I	5	Mathematics 1151.01	Calculus I	5		
	Mathematics 153	Calculus and Analytic Geometry I	5	Mathematics 1152.01	Calculus II	5		
	Physics 131	Introductory Physics: Calculus-based I	5					
	Physics 132	Introductory Physics: Calculus-based II	5	Physics 1250	Introductory Physics: Calculus-based I	5		
	Physics 133	Introductory Physics: Calculus-based III	5	Physics 1251	Introductory Physics: Calculus-based II	5		
		Total Prerequisites Quarter Credit Hours:	**55**		**Total Prerequisites Semester Units:**	**38**	**37**	**+1**
Core major requirements in department	Biochemistry 613	Biochemisry and Molecular Biology I	4	Biochemistry 5613	Biochemisry and Molecular Biology I	3		
	Biochemistry 614	Biochemisry and Molecular Biology II	4	Biochemistry 5614	Biochemisry and Molecular Biology II	3		
	Biochemistry 615	Biochemisry and Molecular Biology III	4	Biochemistry 5615	Biochemisry and Molecular Biology III	3		
	Biochemistry 521 (H521)	Introductory Biological Chemistry Laboratory	5	Biochemistry 5621 (H5621)	Biochemistry &Molecular Biology Laboratory	4		
	Biochemistry 721.01	Physical Biochemistry I	3					
	Biochemistry 721.02	Physical Biochemistry II	3	Biochemistry 5721	Physical Biochemistry I	3		
	Biochemistry 721.04	Physical Biochemistry II	3	Biochemistry 5722	Physical Biochemistry II	3		
		Total Core Major (Dept) Quarter Credit Hours:	**26**		**Total Core Major (Dept) Semester Units:**	**19**	**17**	**+2**
Core major requirements outside department	Chemistry 251	Organic Chemistry I	4	Chemistry x251	Organic Chemistry I	4		
	Chemistry 252	Organic Chemistry II	4	Chemistry x252	Organic Chemistry II	4		
	Chemistry 253	Organic Chemistry III	4					
	Chemistry 254	Organic Chemistry Laboratory I	3	Chemistry 254	Organic Chemistry Laboratory I	2		
	Chemistry 255	Organic Chemistry Laboratory II	3	Chemistry 255	Organic Chemistry Laboratory II	2		
	Chemistry 221	Analytical Chemistry	5	Chemistry x221	Analytical Chemistry	5		
	Mathematics 254	Calculus and Analytic Geometry IV	5	Mathematics 2153.01	Calculus III	4		
	Mol Gen 500 (or 605 & 606)	General Genetics	5	Mol Gen 4500 (or 5606)	General Genetics	3		
		Total Core Major (nonDept) Quarter Credit Hrs:	**33**		**Total Core Major (nonDept) Semester Units:**	**24**	**22**	**+2**
Possible Electives	Biochemistry 693	Individual Studies		Biochemistry 4193	Individual Studies			
	Biochemistry 702	DNA Transactions	3					
	Molecular Genetics 701	Regulation of Gene Expression	3	Biochemistry 6701	DNA Transactions and Regulation	4		
	Biochemistry 706	Advanced Biological Chemistry Lab	5	Biochemistry 6706	Advanced Biological Chemistry Lab	4		
	Biochemistry 735	Plant Biochemistry	3	Biochemistry 7735	Plant Biochemistry	4		
	Biochemistry 761	Advanced Biochemistry: Proteins	3					
	Biochemistry 766	Advanced Biochemistry: Nucleic Acids	3	Biochemistry 6766	Adva Biochem: Macromol Struct & Function	3		
	Biochemistry 762	Advanced Biochemistry: Enzymes	3	Biochemistry 6762	Advanced Biochemistry: Enzymes	3		
	Biochemistry 763	Advanced Biochemistry: Membranes & Bioenergetics	3	Biochemistry 6763	Advanced Biochemistry: Membranes and Lipids	2		
	Biochemistry 765	Physical Biochemistry	3	Biochemistry 7765	Adv Biochem: Physical Biochemistry	3		
	Biochemistry 770	Protein Engineering	3	Biochemistry 7770	Advanced Biochemistry: Protein Engineering	2		
	Biochemistry H783	Honors Thesis Research		Biochemistry H4999	Honors Thesis Research			
	Chemistry	632, 651, 730						
	CSE	221		CSE	2221			
	Mathematics	255, 415		Mathematics	2255, 2415.01			
	Microbiology	520, 521, 632, 661, 680						
	EEOB	410, 512						
GEC	As specified by University policy			As specified by University policy				
Total credit hours/units in major and prerequisites			**114**			**81**	**76**	**+5**
Major program percentage of minimum hours/units for degree (using 180 quarter credit hours and 120 semester units)			**63%**			**68%**		

Appendix C

For Biochemistry Students

Major Program Form

Colleges of the Arts and Sciences

Name _____ (last) _____ (first) _____ (middle) Major Biochemistry

OSU name.# _____ Degree Sought: BA ____ BS X BAJur ____

Local Address _____ (Zip) _____

Phone: _____ Expected date of graduation _____ (quarter), 20____ (year)

Have you filed a degree application in the college office? Yes ____ No ____
(Note: This form is **NOT** a degree application)

If completing two majors, list both below and file a separate form for each one:

1) _____ 2) _____

Part A. Required Prerequisites (and/or supplementary requirements)

Course	Hours	Grade	Course	Hours	Grade
Bio 113 (H115), 114 (H116)	5+5		Chem 123 or 203 or 163	5	
Chem 121 or 201 or 161	5		Phys 131, 132, 133	5+5+5	
Chem 122 or 202 or 162	5		Math 151, 152, 153	5+5+5	

Part B. Major Program (Minimum grade of "C–" required. Minimum grade average of "C" (2.00))
Core Requirements (Substitutions are rarely if ever permitted)

Course	Hours	Grade	Course	Hours	Grade
Chem 251	4		Biochem 613	4	
Chem 252	4		Biochem 614	4	
Chem 253	4		Biochem 615	4	
Chem 254	3		Biochem 521 (H521)	5	
Chem 255	3		Biochem 721.01	3	
Chem 221	5		Biochem 721.02	3	
Math 254	5		Biochem 721.03	3	
Molgen 500 (or 605, 606)	5				

_____ (56 + optional hours)
Total of Part B only

Check whether this is: original ____ revision ____

See back for information about major programs.

Distribution: One copy each – Student
College Office
Denney Hall

_____
Signature of faculty adviser Date

_____
Name of adviser (please print)

_____
Signature of department advisor Date

Biochemistry 292-6771
Department Campus Phone

Appendix C2

GENERAL COLLEGE RULES PERTAINING TO ALL MAJORS

(Consult a departmental representative for specifics)

1. **Requirements for the Major.** The minimum requirement is a coherent program of related work amounting to not fewer than 40 hours of credit in courses numbered 200 or above as prescribed by the student's faculty adviser. (Many departments require more than 40 hours). The major may consist either of courses offered in only one department or of courses found in several allied departments; however, at least 20 of the 40 hours are to be in courses offered by the department of the major unless the major is an interdisciplinary one.

   Courses used to meet curricular requirements other than the major may not be used for the major, except for those courses which have been "starred" by the Arts and Sciences Faculty Curriculum Committee as having a significant writing component; such courses may be applied to Category I.A.2.b. of the basic liberal arts core even though they may be part of a major program.

   Prerequisites to the major may not be taken on a Pass/Non-Pass basis. Although grades of "D" may be accepted by some departments, others require a minimum "C–" for prerequisites; (consult your faculty adviser). Prerequisites may be applied concurrently to other curricular requirements wherever appropriate.

   Transfer credit. In order for a major to be approved with fewer than 20 hours of the program earned at The Ohio State University, the written approval of the faculty adviser, the chairperson of the department and the Vice Provost for the Arts and Sciences must be obtained.

2. **Grade Standards for the Major.** Courses taken on a Pass/Non-Pass basis may not be applied to the major.

   No course in which a grade lower than "C–" has been earned may be used to fulfill a major program requirement. If a student earns a "D+" or lower in a course on the major, the faculty adviser will decide whether the student should a.) repeat the course b.) delete the course from the major c.) substitute another course.

   It is incumbent upon the student to notify the faculty adviser if need for such action arises. Notice of the decision (on a major program revision form signed by the faculty adviser) should be delivered by the adviser or the student to the Arts and Sciences College Office.

   A minimum cumulative point-hour ratio of 2.00 in all courses comprising the major program is required for graduation.

3. **Changes in the Major Program.** Changes in a student's major program can be made only with the written approval of the faculty adviser. They must be filed in the Arts and Sciences Office (by the adviser or the student) at the time approval is given. Such revisions require a major program revision form or a new major program signed by the faculty adviser.

4. **Change of Major.** If a change of major is desired, the student should consult with a faculty adviser representing the new major and submit to the College Office either a PRELIMINARY MAJOR PLANNER or a MAJOR PROGRAM FORM, whichever seems appropriate. It should be borne in mind that changes may result in modifying graduation requirements to such an extent that the date of graduation will be delayed.

5. **Minimum Hours Required Outside the Department of the Major.**

   a.) For students who entered O.S.U. prior to Autumn 1983 and some transfer students entering later, the requirement is as follows:

   For the Bachelor of Arts degree a minimum of 115 hours outside the department of the major is required for graduation. This means that a maximum of 65 hours (including 100-level courses) from a single department may be applied to the usual 180 hours requirement. If hours in excess of 65 are earned, the usual 180 hours requirement is increased by an equal number of hours.

   The minimum required outside the major department for the Bachelor of Science degree is 105 hours.

   The minimum number of hours outside Journalism required for the Bachelor of Arts in Journalism is 141.

   b.) For students who enter O.S.U. Autumn Quarter 1983 or later, the requirement is the same for the Bachelor of Arts and the Bachelor of Science degree programs:

   A minimum of 116 hours outside the department of the major is required. This means that a maximum of 80 hours (including 100-level courses) from a single department may be applied to the usual 196 hours requirement. If hours in excess of 80 are earned, the usual 196 hours requirement is increased by an equal number of hours.

   For the Bachelor of Arts in Journalism the minimum hours required outside Journalism remains at 141 hours.

Appendix C3

FRESHMAN YEAR:		
Autumn:	Winter:	Spring:
Biological Sciences 100	Chemistry 162/122	Chemistry 163/123
Chemistry 161/121	Mathematics 152	Mathematics 153
Mathematics 151	Biology 113	Biology 114
GEC-Social Science		GEC-English 110
SOPHOMORE YEAR:		
Autumn:	Winter:	Spring:
Chemistry 251	Chemistry 252	Chemistry 253
Chemistry 221	Chemistry 254	Chemistry 255
Mathematics 254	GEC-Foreign Language	GEC-Foreign Language
Physics 131	Physics 132	Physics 133
JUNIOR YEAR:		
Autumn:	Winter:	Spring:
Biochemistry 613*	Biochemistry 614*	Biochemistry 615*
Biochemistry 721.01*	Biochemistry 721.02*	Biochemistry 721.03*
GEC-Foreign Language	GEC-Foreign Language	GEC-Second Writing Course
Molecular Genetics 500		Biochemistry 521
SENIOR YEAR		
Autumn:	Winter:	Spring:
GEC-Social Science	GEC-Arts & Humanities-History II	GEC-Social Science
GEC-Arts & Humanities-History I	GEC-Arts & Humanities - Visual/Performing Arts	GEC-Arts & Humanities-Culture and Ideas
GEC-Arts & Humanities-Literature	Elective	Major
Biochemistry 693/783H (not required)	Biochemistry 693/783H (not required)	Biochemistry 693/783H (not required)

*Course is only offered only during the quarter indicated

Appendix D: EXAMPLE OF FOUR-YEAR SEMESTER SCHEDULE FOR THE BIOCHEMISTRY MAJOR (B.S.)

Autumn Semester:	***cr hr***	*Spring Semester:*	***cr hr***	*May Term:*
FRESHMAN YEAR:				
Biological Sciences 100 (Survey)				(TBD)
General Chemistry I (x161-2/x121-2)	5	General Chemistry II (x162-3/x122-3)	5	
Calculus I (Math 1151.01)	5	Calculus II (Math 1152.01)	5	
Biology I (1113)	4	Biology II (1114)	4	
GEC-"Social Science 1"	3	GEC-"Writing Level 1" (English x110)	3	
	17		17	
SOPHOMORE YEAR:				
Autumn Semester:		*Spring Semester:*		*May Term:*
Organic Chemistry I (x251-2)	4	Organic Chemistry II (x252-3)	4	(TBD)
Organic Chemistry Lab I (x254)	2	Organic Chemistry Lab II (x255)	2	
Calculus III (Math 2153.01)	4	Physics II (1251)	5	
Physics I (1250)	5	Biochemistry I (5613)	3	
(GEC requirement?)		GEC-Arts & Humanities-"Literature"	3	
	15		17	
JUNIOR YEAR:				
Autumn Semester:		*Spring Semester:*		*May Term:*
Biochemistry II (5614)	3	Biochemistry III (5615)	3	(TBD)
Physical (Bio)chemistry (5721)	3	Physical Biochemistry (5722)	3	
Molecular Genetics (4500)	3	Analytical Chemistry (x221)	5	
GEC-Foreign Language *	3	GEC-Foreign Language *	3	
GEC-"Writing Level 2"	3	(Elective or Biochemistry 4193/4998)	3	
	15		17	
SENIOR YEAR				
Autumn Semester:		*Spring Semester:*		*May Term:*
Elective or Biochemistry 4193/4998	4	Biochemistry Lab (5621)	4	(TBD)
GEC-"Social Science 2"	3	GEC-"Open Option 1" **	3	
GEC-Arts & Humanities-"History"	3	GEC-"Open Option 2" **	3	
GEC-Arts & Humanities-"Arts"	3	GEC-Arts & Humanities-"Culture and Ideas"	3	
(GEC-Foreign Language) *	3	(GEC-Foreign Language) * or	3	
		(Elective or Biochemistry 4998/4999H)		Total scrhr
	16		16	major: 43 (>30 scrhr required)
Total Credit hours	63		67	overall: 130 (>120 crhr required)

GEC issues:

* Four quarters of Foreign Language is currently required. Same level of proficiency required under semester system (0-12 units)

** New GEC requirements call for 14-18 course offerings (generally of 3 schr) including a new "open option" which can also satisfy prereqs for major or minor
Also, the "Math or Logic" and "Data Analysis" GEC requirement can be met by Math beyond the current 151/152 equivalent and as part of major
Two courses in Biological and Physical Sciences are required; for BA only one lab but for BS must have two lab courses.

Appendix E: Biochemistry Sample Curriculum for the Semester Transition
For Freshmen in 2010-2011

2010-2011 Freshman Year

Autumn Quarter	**Winter Quarter**	**Spring Quarter**
Biological Sciences 100	Chemistry 122 or 162	Chemistry 123 or 163
Chemistry 121or 161	Mathematics 152	Mathematics 153
GEC – Social Science	Biology 113 or 115H	Biology 114 or 116H
		GEC – English 110

2011-2012 Sophomore Year

Autumn Quarter	**Winter Quarter**	**Spring Quarter**
Chemistry 251	Chemistry 252	Chemistry 253
Chemistry 221	Chemistry 254	Chemistry 255
Mathematics 2544	GEC – Foreign Language	**Biochemistry 613 (bridge course)**
Physics 131	Physics 132	Physics 133

2012-2013 Junior Year

Autumn Semester	**Spring Semester**
Biochemistry 5614	Biochemistry 5615
Biochemistry 5721	Biochemistry 5722
Molecular Genetics 4500	Chemistry x221
GEC – Foreign Language.	GEC – Foreign Language
GEC – Writing Level 2	(Elective) or Biochemistry 4193/4998 (not required)

2013-2014 Senior Year

Autumn Semester	**Spring Semester**
(Biochemistry 5621)	(Biochemistry 5621) (taken either Autumn or Spring)
Biochemistry 4998 or 4999H (not required)	Biochemistry 4998 or 4999H (not required)
GEC – Arts & Human.-History	GEC Option
GEC –Arts & Human's-Vis/Perform Arts	GEC –Arts & Human-Culture and Ideas
GEC – Foreign Language	(GEC – Foreign Language)

Appendix F: Biochemistry Sample Curriculum for the Semester Transition
For Freshmen in 2011-2012

2011-2012 Freshman Year

Autumn Quarter	**Winter Quarter**	**Spring Quarter**
Biological Sciences 100	Chemistry 122 or 162	Chemistry 123 or 163
Chemistry 121or 161	Mathematics 152	Mathematics 153
GEC – Social Science	Biology 113 or 115H	Biology 114 or 116H
		GEC – English 110

2012-2013 Sophomore Year

Autumn Semester	**Spring Semester**
Chemistry x251-2	Chemistry x252-3
Chemistry x254	Chemistry x255
Physics 1250	Physics 1251
Mathematics 2153.01	Biochemistry 5613

2013-2014 Junior Year

Autumn Semester	**Spring Semester**
Biochemistry 5614	Biochemistry 5615
Biochemistry 5721	Biochemistry 5722
Molecular Genetics 4500	Chemistry x221
GEC – Foreign Language.	GEC – Foreign Language
GEC – Social Science	

2014-2015 Senior Year

Autumn Semester	**Spring Semester**
(Biochemistry 5621)	(Biochemistry 5621) (either Autumn or Spring)
Biochemistry 4998 or 4999H (not required)	Biochemistry 4998 or 4999H (not required)
GEC – Arts & Human.-History II	GEC Option
GEC –Arts & Human's-Vis/Perform Arts	GEC –Arts & Human-Culture and Ideas
GEC – Foreign Language	(GEC – Foreign Language)

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Memo

To: Office of Academic Affairs

From: Mark P. Foster, Interim Chair, Department of Biochemistry

Date: 10/29/2010

Re: Semester Conversion Proposal – Biochemistry Major, B.S. and B.A. Degrees

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The Department of Biochemistry has the following programs to be converted for the quarter to semester system:

The Undergraduate Biochemistry major (B.S. and B.A)
The Undergraduate Biochemistry minor
The Graduate Masters Degree
The Graduate Ph.D. Degree (This program is administered by the campus-wide Ohio State Biochemistry Program)

The subject of this proposal is the Undergraduate Biochemistry Major and Minor programs. Other programs will be submitted separately either by this department or the OSBP.

Prof. Richard P. Swenson served as the Department's Semester Conversion Coordinator. The process began during the fall, 2009 and proceeded through the academic year. Dr. Swenson met regularly with the Department's Curriculum Committee and individually or in groups with the course instructors over this time to obtain both a broad and course specific perspective on the conversion of our undergraduate curriculum and major.

The proposed course conversions and associated changes to the major were discussed at several faculty meetings and final unanimous faculty approval for the undergraduate curriculum conversion was given at the April 7, 2010 meeting.

Mark P. Foster