

<b>Fiscal Unit/Academic Org</b>	Biochemistry - D0310
<b>Administering College/Academic Group</b>	Arts And Sciences
<b>Co-administering College/Academic Group</b>	
<b>Semester Conversion Designation</b>	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)
<b>Current Program/Plan Name</b>	Biochemistry
<b>Proposed Program/Plan Name</b>	Biochemistry
<b>Program/Plan Code Abbreviation</b>	BIOCHEM-MS
<b>Current Degree Title</b>	Master 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		45	30.0	30	0.0
Required credit hours offered by the unit	Minimum	27	18.0	14	4.0
	Maximum	30	20.0	16	4.0
Required credit hours offered outside of the unit	Minimum	0	0.0	0	0.0
	Maximum	3	2.0	2	0.0
Required prerequisite credit hours not included above	Minimum				
	Maximum				

## 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**
- Graduate Program--Program Learning Goals need not be provided at this time but will be re-evaluated and submitted prior to the 2012 deadline.

## 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? No**

**DIRECT MEASURES (means of assessment that measure performance directly, are authentic and minimize mitigating or intervening factors)**

### Standardized tests

- Local comprehensive or proficiency examinations

### Classroom assignments

- Embedded testing (i.e. specific questions in homework or exams that allow faculty to assess students' attainments of a specific learning goal)
- Other classroom assessment methods (e.g., writing assignments, oral presentations, oral exams)

**Evaluation of a body of work produced by the student**

- Practicum, internship or research evaluation of student work

**Direct assessment methods specifically applicable to graduate programs**

- Thesis/dissertation oral defense and/or other oral presentation
- Thesis/dissertation (written document)
- Publications

**INDIRECT MEASURES (means of assessment that are related to direct measures but are steps removed from those measures)****Surveys and Interviews**

- Student survey
- Student evaluation of instruction

**Additional types of indirect evidence**

- Job or post-baccalaureate education placement
- Student or alumni honors/recognition achieved
- Curriculum or syllabus review
- Grade review
- Comparison or benchmarking

**USE OF DATA (how the program uses or will use the evaluation data to make evidence-based improvements to the program periodically)**

- Meet with students directly to discuss their performance
- Analyze and discuss trends with the unit's faculty
- Analyze and report to college/school
- Make improvements in curricular requirements (e.g., add, subtract courses)
- Make improvements in course content
- Make improvements in course delivery and learning activities within courses
- Make improvements in learning facilities, laboratories, and/or equipment
- Periodically confirm that current curriculum and courses are facilitating student attainment of program goals

**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 MS Program Request Attachments.pdf: Attachments (letter, rationale, advising, etc )  
*(Program Proposal. Owner: Swenson, Richard Paul)*
- Curriculum Map for MS Degree.pdf: Curricular Map  
*(Curricular Map(s). Owner: Swenson, Richard Paul)*

**Comments**

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Swenson, Richard Paul	01/24/2011 03:36 PM	Submitted for Approval
Approved	Swenson, Richard Paul	01/27/2011 04:53 PM	Unit Approval
Pending Approval	Andereck, Claude David	01/27/2011 04:53 PM	College Approval



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# Memo

To: Office of Academic Affairs  
From: Mark P. Foster, Interim Chair, Department of Biochemistry  
Date: 1/3/2011  
Re: Semester Conversion Proposal – Biochemistry M.S. Degree (Thesis Option)

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

The subject of this proposal is the Graduate Masters Degree (Thesis Option). 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 and as modified at its December 1, 2010 meeting.

## ***PROGRAM REQUIREMENTS***

### **Program Rationale.**

The Biochemistry M.S. degree (thesis option) represents a viable choice for students holding a bachelors degree in a suitable area who desire additional training in biochemistry beyond the bachelors degree but who do not wish to pursue a doctoral degree. Exceptional career opportunities exist for students with such advanced training in science either in academia, teaching, or industry. Students often find rewarding careers as laboratory managers and/or technical support staff within research institutes or universities. This two-year program is based on the development of a foundation of advanced graduate courses encompassing current concepts in the field's knowledge base and method of study of the major biopolymers and biological processes. Training and experience in the process of research assists in developing the student's integration of the concepts as well as develop an appreciation and experience in the research process. Students generally complete most of the course requirements during their first year and then choose a thesis advisor and begin an independent research project typically during that following summer.

The M.S. degree program is reviewed on an ongoing basis by the Department. The structure of the curriculum is driven in large part by the courses developed and offered within the doctoral program in biochemistry as administered by the Ohio State Biochemistry Program (OSBP). Its curriculum committee has recommended several modifications to its core courses that will have only a small impact on our M.S. degree program but primarily in the structure and organization of some of the courses. The most significant changes involve the merger of Molecular Genetics 701 and Biochemistry 702 into a single semester course entitled "DNA Transactions and Regulation" as well as the combination of Biochemistry 761 and 766 into a single semester course covering advanced topics in the major biopolymers. Both mergers provide for great flexibility and efficiency in the instruction of the closely related subject areas in each instance. For example, the common methodology of study and similar conceptual basis involved for proteins and nucleic acid polymers can be taught in a more integrated manner and with less repetition than currently offered within the two separate quarter courses. Another minor change is the conversion of the quarter courses Biochemistry 762 (Enzymes) and 763 (Membranes and Bioenergetics) into 7-week "minimester" versions with some alteration in course content envisioned. These two topics can then be taught sequentially rather than simultaneously as might be required otherwise. Also, the faculty has discussed and approved the elimination of the current advanced graduate laboratory requirement (Biochemistry 706) in the semester system in favor of an increased emphasis on independent research.

SUMMARY OF QUARTER TO SEMESTER CONVERSION OF ALL BIOCHEMISTRY COURSES LISTED IN "BOOK 3"

Current Course Number	Current Quarter Credit Hours	Level	Course Number	Suffix	Course Title	Transcript Abbreviation	Semstr Credit Hours	Fixed OR Variable Min	Variable Max	Repeatable?	Credit Hours/ Units Allowed	14 week	7 Week	4 Week (May/term)	12 Week (May + Summer)
H200	2	Undergrad	1200.	Honors	Early Experience in Research in Biochemistry: Seminar	Early Resrch Semin	Fixed	1.0		No		Yes			
H201		Undergrad	1201.	Honors	Early Experience in Research in Biochemistry: Laboratory	Early Resrch Lab	Variable	1.0	3.0	No		Yes			
294		Undergrad	2194.		Group Studies	Group Studies	Variable	1.0	4.0	Yes	8	Yes	Yes	Yes	Yes
211/212	6	Undergrad	2210.		Elements of Biochemistry	Elem Of Biochem	Fixed	4.0		No		Yes			
698.01		Undergrad	3798.01		Study Tour: Domestic	Study Tour-Domesti	Variable	1.0	10.0	Yes	99	Yes	Yes	Yes	Yes
698.02		Undergrad	3798.02		Study Tour: Foreign	Study Tour-Foreign	Variable	1.0	10.0	Yes	99	Yes	Yes	Yes	Yes
693		Undergrad	4193.		Individual Studies	Individual Studies	Variable	1.0	7.0	Yes	28	Yes	Yes	Yes	Yes
694		Undergrad	4194.		Group Studies	Group Studies	Variable	1.0	4.0	Yes	16	Yes	Yes	Yes	Yes
511	5	Undergrad	4511.		Introduction to Biological Chemistry	Intro To Biol Chem	Fixed	4.0		No		Yes			
591	2	Undergrad	4591.		DNA Finger Printing Workshops in Columbus Public Schools	DNA Fingr Prnt CPS	Fixed	1.0		Yes	4				
699		Undergrad	4998.		Undergraduate Research in Biochemistry	Undergrad Research	Variable	1.0	10.0	Yes	10	Yes	Yes		Yes
H783		Undergrad	4999.	Honors	Honors Thesis Research	Honors Research	Variable	1.0	3.0	Yes	10	Yes	Yes		Yes
613	4	Undergrad	5613.		Biochemistry and Molecular Biology I	Biochem&Mol Biol 1	Fixed	3.0		No		Yes			
614	4	Undergrad	5614.		Biochemistry and Molecular Biology II	Biochem&Mol Biol 2	Fixed	3.0		No		Yes			
615	4	Undergrad	5615.		Biochemistry and Molecular Biology III	Biochem&Mol Biol 3	Fixed	3.0		No		Yes			
521	5	Undergrad	5621.		Biochemistry and Molecular Biology Laboratory	Biochem/MolBio Lab	Fixed	4.0		No		Yes			
H521	5	Undergrad	5621.	Honors	Biochemistry and Molecular Biology Laboratory	Biochem/MolBio Lab	Fixed	4.0		No		Yes			
721.01/.02	4.5	Undergrad	5721.		Physical Biochemistry I	Physical Biochem 1	Fixed	3.0		No		Yes			
721.02/.03	4.5	Undergrad	5722.		Physical Biochemistry II	Physical Biochem 2	Fixed	3.0		No		Yes			
(701)/702	6	Graduate	6701.		DNA Transactions; Regulation of Gene Expression	Regul Gene Express	Fixed	4.0		No		Yes			
706	5	Graduate	6706.		Advanced Biological Chemistry Lab	Adv Biol Chem Lab	Fixed	4.0		No		Yes			
708		Graduate			Protein and Enzyme Laboratory [DISCONTINUE]										
710		Graduate			Molecular Biology Laboratory [DISCONTINUE]										
761/766	6	Graduate	6761.		Advanced Biochemistry: Macromolecular Structure and Function	AdvBiochm-Macromol	Fixed	3.0		No		Yes			
762	3	Graduate	6762.		Advanced Biochemistry: Enzymes	AdvBiochm-Enzymes	Fixed	1.5		No		No	Yes		
763	2	Graduate	6763.		Advanced Biochemistry: Membranes and Lipids	AdvBiochm-Membrane	Fixed	1.5		No		No	Yes		
764	3	Graduate			Advanced Biochemistry: Intergration of Metabolism (NO LONGER CROSSLIST WITH MCB)	AdvBiochm-Metabol	Fixed								
795		Graduate	6795.		Special Topics in Biochemistry	Spcl Tpcs Biochem	Variable	1.0	2.0	Yes	28	Yes	Yes		
850	2	Graduate	6850.		Seminar in Biological Chemistry	Biochem Seminar	Fixed	1.0		Yes	28	Yes			
735/736	6	Graduate	6735.		Plant Biochemistry	Plant Biochemistry	Fixed	3.0		No		Yes			
765	3	Graduate	7765.		Advanced Biochemistry: Physical Biochemistry*	AdvBiochm-Physical	Fixed	3.0		No		Yes			
770	3	Graduate	7770.		Advanced Biochemistry: Protein Engineering	Protein Engineerng	Fixed	2.0		No		Yes			
775	3	Graduate	7775.		Biophysical Chemistry	Biophysical Chem	Fixed	2.0		No		Yes			
821	3	Graduate	8821.		Advanced Enzymology	Adv Enzymes	Fixed	2.0		No		Yes			
890		Graduate			Interdepartmental Seminar in MCDB [DISCONTINUED]										
892		Graduate			Interdepartmental Seminar in Plant Physiol [DISCONTINUED]										
905	3	Graduate	8900.		Advanced Biochemistry: Biomolecular NMR	Biomolecular NMR	Fixed	2.0		No		Yes			
900		Graduate	8990.		Advanced Topics in Biochemistry	AdvTopics-Biochem	Variable	1.0	2.0	Yes	16	Yes	Yes	Yes	Yes
999		Graduate	8999.		Research for Dissertation or Thesis	Thesis Research	Variable	1.0	12.0	Yes	99	Yes			

Total: 92

Overall, the conversion of all "Fixed" credit hour courses represents no net change in converted credit hours based on the 2/3 formula.

61.0

Sem equiv: 61 (2/3)

Last name: \_\_\_\_\_ Address: \_\_\_\_\_  
 First Name: \_\_\_\_\_  
 Middle: \_\_\_\_\_ City: \_\_\_\_\_  
 OSU ID: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
 lastname.#: \_\_\_\_\_  
 Expected graduation: \_\_\_\_\_ Semester: \_\_\_\_\_ Year: \_\_\_\_\_  
 Additional Majors: 1. \_\_\_\_\_ 2. \_\_\_\_\_  
 Additional Minors: 1. \_\_\_\_\_ 2. \_\_\_\_\_

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

**Part A. Minimum grade average of "B" (3.00) required)**  
**Core Requirements** (Substitutions are rarely, if ever, permitted)

Course	Hours	Grade	Course	Hours	Grade
Biochemistry 6701	4		Biochemistry 7770	2	
Biochemistry 6761	3		Biochemistry 6850	2	
Biochemistry 6762	1.5		Biochemistry 8999	≥14	
Biochemistry 6763	1.5				

**Part B. Electives** (Total of 2 hours required from approved list of electives)

Course	Hours	Grade	Course	Hours	Grade

**\_\_\_\_\_** (≥30 + optional hours)  
 Total of Parts A & B

Check whether this is: original \_\_\_\_\_ revision \_\_\_\_\_

\_\_\_\_\_  
 Signature of faculty advisor Date

See back for information about major programs.

\_\_\_\_\_  
 Name of advisor (please print)

Distribution: One copy each- \_\_\_\_\_ Student  
 \_\_\_\_\_ Dept Office

\_\_\_\_\_  
 Signature of department advisor Date

**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. No significant transitional issues are anticipated. Students entering into the program at the beginning of the 2011-12 academic year will be provided with course information under the current quarter system as well as under semesters beginning in their second year. To aid in their planning, they will be provided with also examples of the two-year schedule during the transition and under the semester system (see appendices).



**Appendix. EXAMPLE - TWO-YEAR TRANSITIONAL SCHEDULE FOR THE BIOCHEMISTRY M.S. (THESIS)**

**YEAR 1 UNDER QUARTER SYSTEM:**

<i>Autumn Quarter:</i>	<b>cr hr</b>	<i>Winter Quarter:</i>	<b>cr hr</b>	<i>Spring Quarter:</i>	<b>cr hr</b>
Molecular Genetics 701	3	Biochemistry 702	3	Biochemistry 999	6
Biochemistry 761	3	Biochemistry 763	2	Elective ( $\geq 3$ crhrs)*	3
Biochemistry 762	3	Biochemistry 766	3		
Biochemistry 850	1	Biochemistry 850	1		
Total Credit hours	<u>10</u>		<u>9</u>		<u>9</u>

**SUMMER TERM BETWEEN YEAR 1 AND 2:**

(Biochemistry 999)\*\*

**YEAR 2 UNDER SEMESTER SYSTEM:**

<i>Autumn Semester:</i>		<i>Spring Semester:</i>		<i>May/Summer Term:</i>
Biochemistry 7770	2	Biochemistry 8999	6	N/A
Biochemistry 8999	4			
Total Credit hours	<u>6</u>		<u>6</u>	

28 :overall quarter crhrs  
12 :overall semester crhrs

\* One elective from an approved list in the biological or physical sciences at >5000 (>6000 for departmental courses) required

\*\* Additional dissertation research credits could be achieved during the Summer Term between the 1st and 2nd year

**Appendix. EXAMPLE - TWO-YEAR SEMESTER SCHEDULE FOR THE BIOCHEMISTRY M.S. (THESIS)**

**YEAR 1:**

<i>Autumn Semester:</i>	<i>cr hr</i>	<i>Spring Semester:</i>	<i>cr hr</i>	<i>May and Summer Terms:</i>
Biochemistry 6701	4	Biochemistry 6762 (First 7 weeks)	1.5	(Biochemistry 8999)**
Biochemistry 6761	3	Biochemistry 6763 (Second 7 weeks)	1.5	
		Elective ( $\geq 2$ crhrs)*	2	
Biochemistry 6850	1	Biochemistry 6850	1	
	<hr/>		<hr/>	
	8		6	

**YEAR 2:**

<i>Autumn Semester:</i>		<i>Spring Semester:</i>		<i>May Term:</i>
Biochemistry 7770	2	Biochemistry 8999	8	N/A
Biochemistry 8999	6			
	<hr/>		<hr/>	
	8		8	
	<hr/>		<hr/>	
	16		14	overall: 30 ( $\geq 30$ crhr required)

\* One elective from an approved list in the biological or physical sciences at >5000 (>6000 for departmental courses) required

\*\* Additional dissertation research credits could be achieved during the May and Summer Terms between the 1st and 2nd year

**Curriculum Map: Biochemistry M.S. degree (thesis option) - 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
<b>Core degree requirements in department</b>	Biochemistry 702	DNA Transactions	3					
	Molecular Genetics 701	Regulation of Gene Expression	3	Biochemistry 6701	DNA Transactions and Regulation	4		
	Biochemistry 761	Proteins	3					
	Biochemistry 766	Nucleic Acids	3	Biochemistry 6761	Adv Biochemistry: Macromolecular Structure & Function	3		
	Biochemistry 762	Enzymes	3	Biochemistry 6762	Advanced Biochemistry: Enzymes	1.5		
	Biochemistry 763	Membranes and Bioenergetics	2	Biochemistry 6763	Advanced Biochemistry: Membranes and Lipids	1.5		
	Biochemistry 770	Protein Engineering	3	Biochemistry 7770	Advanced Biochemistry: Protein Engineering	2		
	Biochemistry 706	Biological Chemistry Laboratory	5	(formal laboratory course requirement dropped in favor of more thesis research)				
	Biochemistry 850	Seminar	2	Biochemistry 6850	Seminar (1st year-1 unit each semester)	2		
<b>Total Core (Dept) Quarter Credit Hours:</b>			<b>27</b>	<b>Total Core (Dept) Semester Units:</b>		<b>14</b>	<b>18</b>	<b>-4</b>
<b>Electives:</b>	<b>Total of 3 credit hours chosen from:</b>			<b>Electives:</b>				
	Chemistry	632, 651, 652, 731, 733		Chemistry	Semester equivalents as established			
	Microbiology	509, 520, 521, 649, 670, 680, 723		Microbiology	Semester equivalents as established			
	Molecular Genetics	622, 640, 650, 705, 715, 734		Molecular Genetics	Semester equivalents as established			
	Other Sciences	>500 level (>600 for departmental courses)		Other Sciences	>5000 level (>6000 for departmental courses)			
<b>Total Electives Quarter Credit Hours:</b>			<b>3</b>	<b>Total Electives Semester Units:</b>		<b>2</b>	<b>2</b>	<b>0</b>
<b>Research:</b>	Biochemistry 999	Thesis Research	15	Biochemistry 8999	Research for Dissertation or Thesis	14	10	+4
<b>Total credit hours/units required for degree:</b>			<b>45</b>	(45 crhrs required)		<b>30</b>	(30 semester units required)	

