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|--|--|
| <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>         | Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses) |
| <b>Current Program/Plan Name</b>               | Biochemistry Minor   |
| <b>Proposed Program/Plan Name</b>              | Biochemistry Minor   |
| <b>Program/Plan Code Abbreviation</b>          | BIOCHEM-MN   |
| <b>Current Degree Title</b>                    |  |

### 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 |         | 20  | 13.3   | 15  | 1.7                       |
| Required credit hours offered by the unit                     | Minimum | 17  | 11.3   | 13  | 1.7                       |
|   | Maximum | 20  | 13.3   | 15  | 1.7                       |
| 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 | 47  | 31.3   | 31  | 0.3                       |
|   | Maximum | 47  | 31.3   | 31  | 0.3                       |

### 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 broader context for biochemical processes.
- 2.1 Understand the chemical, mathematical, and physical concepts required to describe biological processes.
- 2.2 Identify and reproduce the structures of biological molecules such as polypeptides, nucleic acids, carbohydrates, and lipids.
- 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 minor program consists of a combination of embedded testing, laboratory reports, colloquium evaluations, 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 the "Attachment" section. It should be noted that while many of the learning outcomes are shared with the major, different levels of fulfillment are anticipated and so indicated within that table.

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.

No significant modifications are envisioned during the conversion to the semester system, however.

## 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 Minor Program Request Attachments REV\_2.pdf: Attachments (letter, rationale, advising, etc)  
*(Program Proposal. Owner: Swenson,Richard Paul)*
- Curriculum Map for Biochemistry minor\_Rev 2.pdf: Curriculum Map - Biochemistry Minor  
*(Curricular Map(s). Owner: Swenson,Richard Paul)*
- Biochemistry minor cover letter.doc: NMS Division of Arts and Sciences cover letter  
*(Letter from the College to OAA. Owner: Andereck,Claude David)*

## Comments

- There were no substantive curriculum issues raised at the last College review. However, the attachments contain revised materials requested during the College review. The majority of the revisions are corrections to minor typos, wording, and the inclusion of alternative approved Chemistry courses in the suggested transition and semester schedules. The table of assessment of learning outcomes, which have been adjusted somewhat, has now been included as part of the attachments. *(by Swenson,Richard Paul on 06/01/2011 12:51 PM)*

## Workflow Information

| Status             | User(s)  | Date/Time           | Step                   |
|--------------------|--|---------------------|------------------------|
| Submitted          | Swenson,Richard Paul   | 01/24/2011 03:34 PM | Submitted for Approval |
| Approved           | Swenson,Richard Paul   | 01/27/2011 04:52 PM | Unit Approval          |
| Revision Requested | Andereck,Claude David  | 02/02/2011 03:10 PM | College Approval       |
| Submitted          | Swenson,Richard Paul   | 06/01/2011 12:53 PM | Submitted for Approval |
| Approved           | Swenson,Richard Paul   | 06/01/2011 01:40 PM | Unit Approval          |
| Revision Requested | Andereck,Claude David  | 06/03/2011 03:54 PM | College Approval       |
| Submitted          | Swenson,Richard Paul   | 06/06/2011 01:45 PM | Submitted for Approval |
| Approved           | Swenson,Richard Paul   | 06/06/2011 01:47 PM | Unit Approval          |
| Approved           | Andereck,Claude David  | 06/07/2011 02:18 PM | College Approval       |
| Pending Approval   | Hanlin,Deborah Kay<br>Vankeerbergen,Bernadette Chantal<br>Meyers,Catherine Anne<br>Jenkins,Mary Ellen Bigler<br>Nolen,Dawn | 06/07/2011 02:18 PM | ASCCAO Approval        |

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June 7, 2011

Larry Krissek  
Chair, Arts and Sciences CCI

Dear Larry:

It is a pleasure to forward to you for consideration by the CCI and the Sciences Subcommittee the proposal for the minor in Biochemistry under semesters. The program is largely a straightforward conversion, but has been modestly modified through the expansion of the current three quarter foundational sequence to a three semester sequence.

Beyond my own review of the documents, the proposal has been discussed by colleagues from other NMS units at a meeting on February 2, 2011. Feedback from these discussions has now been incorporated in the proposal.

If you have any questions, I would be happy to address them.

Sincerely,



David Andereck  
Professor of Physics  
Associate Dean of Natural and Mathematical Sciences, College of Arts and Sciences



**Mark P. Foster, PhD**

**Department of Biochemistry**

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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 Minor

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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 Undergraduate Biochemistry Minor. 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. \*

\*Note: Thirteen of the 15 eligible voting faculty were present.

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## Program Rationale.

The Biochemistry minor was evaluated in 2007 along with major (both B.S. and B.A. degree options) and as part of an internal departmental review. The overall conclusion that was reached was that the structure of the minor 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 minor is built on a solid foundation of prerequisite courses in biology, chemistry, and mathematics followed by a series of core biochemistry courses.

With one exception discussed below, the basic core of the curriculum was left largely unaltered during the conversion to the semester format. Most of the prerequisites as well as the non-departmental and departmental core courses will be converted directly following the 2/3 conversion process. Many of the prerequisites 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.

The three-quarter core biochemistry series (Biochemistry 613, 614, and 615) will be expanded to a three-semester series and the required biochemistry laboratory course (521) will be slightly expanded (from the current 10-week quarter to the full semester) to include additional topics as described and justified below. No other changes in the course requirements for the minor are planned.

*Rationale for expansion of the core biochemistry series.* The three-quarter core biochemistry series (Biochemistry 613, 614, and 615) will be expanded to a three-semester series rather than to directly convert this three-quarter series to a two-semester plan. 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 areas 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, an 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 discussed above. It is also concluded that these changes will bring our major core closer to our peer-institution comparison group.

The advising of students choosing to minor in biochemistry will be critical. The prerequisite courses will need to be scheduled early in the student's tenure so that sufficient time will be available to complete the three-semester core biochemistry series. To facilitate scheduling, Biochemistry 5613 will be taught during Spring Semester. Students will be advised to enroll in this course during their second year followed by 5614 and 5615 in the Autumn and Spring, respectively, of their third year. With this schedule, students will be taking the final organic chemistry as a corequisite with Biochemistry 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. It is feasible for students to begin the core biochemistry series in the Spring Semester of their 3rd year; however, they will be advised of the difficulty this might create should unsatisfactory progress be made in Biochemistry 5613 or prerequisites. In this case, the student would fall out of sequence for enrolling in the required Biochemistry 5614 and 5615 in their fourth year. Also, by beginning the biochemistry series in their 2nd year, students should have sufficient time to focus on the course requirements of their major in their final two years.

## SUMMARY OF QUARTER TO SEMESTER CONVERSION OF BIOCHEMISTRY COURSES RELEVANT TO THE MINOR

| 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 (MayTerm) | 12 Week (May + Summer) |
|---|------------------------------|-----------|---------------|--------|--|-------------------------|---------------------|-----------------------|--------------|-------------|-----------------------------|---------|--------|------------------|------------------------|
| H200                                    | 2                            | Undergrad | 1900.         | Honors | Early Experience in Research in Biochemistry: Seminar    | Early Resrch Semin      | Fixed               | 1.0                   |              | No          |                             | Yes     |        |                  |                        |
| H201                                    | Variable                     | Undergrad | 1998.         | Honors | Early Experience in Research in Biochemistry: Laboratory | Early Resrch Lab        | Variable            | 1.0                   | 3.0          | No          |                             | Yes     |        |                  |                        |
| 294                                     | Variable                     | Undergrad | 2194.         |        | Group Studies  | Group Studies           | Variable            | 1.0                   | 4.0          | Yes         | 8                           | Yes     | Yes    | Yes              | Yes                    |
| 698.01                                  | Variable                     | Undergrad | 3798.01       |        | Study Tour: Domestic                                     | Study Tour-Domesti      | Variable            | 1.0                   | 10.0         | Yes         | 99                          | Yes     | Yes    | Yes              | Yes                    |
| 698.02                                  | Variable                     | Undergrad | 3798.02       |        | Study Tour: Foreign                                      | Study Tour-Foreign      | Variable            | 1.0                   | 10.0         | Yes         | 99                          | Yes     | Yes    | Yes              | Yes                    |
| 693                                     | Variable                     | Undergrad | 4193.         |        | Individual Studies                                       | Individual Studies      | Variable            | 1.0                   | 7.0          | Yes         | 28                          | Yes     | Yes    | Yes              | Yes                    |
| 694                                     | Variable                     | Undergrad | 4194.         |        | Group Studies  | Group Studies           | Variable            | 1.0                   | 4.0          | Yes         | 16                          | Yes     | Yes    | Yes              | Yes                    |
| 699                                     | Variable                     | Undergrad | 4998.         |        | Undergraduate Research in Biochemistry                   | Undergrad Research      | Variable            | 1.0                   | 5.0          | Yes         | 15                          | Yes     | Yes    |                  | Yes                    |
| (new)                                   | Variable                     | Undergrad | 4998.         | Honors | Honors Undergraduate Research in Biochemistry            | Undergrad Research      | Variable            | 1.0                   | 5.0          | Yes         | 15                          | Yes     | Yes    |                  | Yes                    |
| (new)                                   |                              | Undergrad | 5193.         |        | Individual Studies                                       | Group Studies           | Variable            | 1.0                   | 3.0          | Yes         | 10                          | Yes     | Yes    |                  | Yes                    |
| (new)                                   |                              | Undergrad | 5194.         |        | Group Studies  | Group Studies           | 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     |        |                  |                        |
| <b>Possible biochemistry electives:</b> |                              |           |               |        |  |                         |                     |                       |              |             |                             |         |        |                  |                        |
| 721.01/.02                              | 4.5                          | Undergrad | 5721.         |        | Physical Biochemistry I                                  | Physical Biochem 1      | Fixed               | 3.0                   |              | No          |                             | Yes     |        |                  |                        |
| 761/766                                 | 6                            | Graduate  | 6761.         |        | Advanced Biochemistry: Macromolecular Structure and      | 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  | 6764.         |        | Advanced Biochemistry: Metabolism                        | AdvBiochm-Metabol       | Fixed               | 2.0                   |              | No          |                             | No      | Yes    |                  |                        |
| 795                                     | Variable                     | 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     |        |                  |                        |

Version: 03/03/2011

## Fulfillment of Learning Outcomes and Assessment - Biochemistry minor

| <b>1. Understand the relationship of biochemistry to broader areas of science</b>  |  |  |
|--|--|--|
|  | Fulfilled by:  | Assessment method  |
| 1.1 Demonstrate an understanding of Mendelian, molecular, and population genetics, as well as molecular biology  | Biology 1113 (or H1115)*                                   | Syllabus review; instructor feedback   |
| 1.2 Discuss evolution, ecology, and organismal biology as a broader context for biochemical processes  | Biology 1113, 1114 (or H1115, H1116)*                      | Syllabus review; instructor feedback   |
| <b>2. Apply chemical, mathematical, and physical concepts to describe biological processes</b>   |  |  |
| 2.1 Understand the chemical, mathematical, and physical concepts required to describe biological processes   | Chem 1210 or 1610; Math 1151.01; Biochem 5613***           | Syllabus analysis; instructor feedback; faculty questionnaire; embedded quiz in Biochem 5613 |
| 2.2 Identify and reproduce the structures of biological molecules such as polypeptides, nucleic acids, carbohydrates, and lipids   | Biology 1113 or H1115*; Biochemistry 5613, 5614, & 5615*** | Syllabus review; embedded questions  |
| 2.3 Explain how macromolecular structure and dynamics determine biological function of a biomolecule or biomolecular complex   | Biochemistry 5613, 5614, & 5615***                         | Embedded questions   |
| 2.4 Describe the relative merits of various methods to determine molecular structure and dynamics  | Biochemistry 5613, 5614, & 5615***                         | 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 5613, 5614, & 5615***                         | Embedded questions   |
| <b>3. Apply biochemical concepts to explain basic cellular processes</b>   |  |  |
| 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*; Biochemistry 5614***               | Embedded questions   |
| 3.2 Describe the regulation and control of gene expression, DNA repair, and DNA replication  | Biology 1113*; Biochemistry 5615***                        | Embedded questions   |



| <b>4. Use scientifically valid reasoning to investigate and articulate how biochemical knowledge is acquired</b>                                     |   |   |
|--|---|---|
| 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**;<br>Biochemistry 5621***,<br>6850**, research<br>courses***       | Laboratory reports,<br>colloquium evaluations |
| 4.2 Conduct standard chemical and biochemical experiments in the laboratory and draw conclusions from experimental data                              | Lab components of chemistry courses**;<br>Biochemistry 5621***;<br>research courses***                  | Laboratory reports;<br>colloquium evaluations |
| 4.3 Design appropriate experimental approaches to a biochemical problem using the theoretical basis for common laboratory experiments and procedures | All courses**,<br>particularly<br>Biochemistry 5621***  | 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;<br>writing assignments (<br>Biochem 5614 and<br>5615) seminar<br>(Biochem 6850**) | Colloquium evaluations;<br>ASC Senior survey  |
| 4.5 Understand the relationship of the major area to broader areas of science.   | All courses   | Colloquium evaluations;<br>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<br>assignment), Biochem<br>6850; research courses                                 | Colloquium evaluations                        |
| Fulfillment level:<br>* Basic<br>** Intermediate<br>*** Advanced   |   |   |

**COLLEGE OF ARTS AND SCIENCES - BACHELOR OF ARTS/SCIENCES - MINOR: BIOCHEMISTRY**

Last name: \_\_\_\_\_ Address: \_\_\_\_\_  
 First Name: \_\_\_\_\_  
 Middle: \_\_\_\_\_ City: \_\_\_\_\_  
 OSU ID: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
 lastname.#: \_\_\_\_\_  
 Expected graduation: \_\_\_\_\_ Quarter: \_\_\_\_\_ Year: \_\_\_\_\_  
 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. Required Prerequisites** (and/or supplementary requirements)

| Course                         | Hours | Grade | Course        | Hours | Grade |
|--------------------------------|-------|-------|---------------|-------|-------|
| Biology 113 (or H115)          | 5     |       | Math 151      | 5     |       |
| Biology 114 (or H116)          | 5     |       | Math 152      | 5     |       |
| Chemistry 161 (or 121 or 201H) | 5     |       | Chemistry 251 | 4     |       |
| Chemistry 162 (or 122 or 202H) | 5     |       | Chemistry 252 | 4     |       |
| Chemistry 163 (or 123 or 203H) | 5     |       | Chemistry 253 | 4     |       |

**Part B. Minor 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 |
|----------------------------|-------|-------|---|-------|-------|
| Biochemistry 613           | 4     |       | Add'l biochemistry or<br>related physical or<br>biological science }<br>} | 3     |       |
| Biochemistry 614           | 4     |       |   |       |       |
| Biochemistry 615           | 4     |       |   |       |       |
| Biochemistry 521 (or H521) | 5     |       |   |       |       |
|                            |       |       |   |       |       |
|                            |       |       |   |       |       |
|                            |       |       |   |       |       |
|                            |       |       |   |       |       |

**\_\_\_\_\_** (20 + optional hours)

*Total of Part B only*

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

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

See back for information about minor programs.

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

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

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

**COLLEGE OF ARTS AND SCIENCES - BACHELOR OF ARTS/SCIENCES - MINOR: BIOCHEMISTRY**

Last name: \_\_\_\_\_ Address: \_\_\_\_\_  
 First Name: \_\_\_\_\_  
 Middle: \_\_\_\_\_ City: \_\_\_\_\_  
 OSU ID: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
 lastname.#: \_\_\_\_\_  
 Expected graduation: \_\_\_\_\_ Semester: \_\_\_\_\_ Year: \_\_\_\_\_  
 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. Required Prerequisites** (and/or supplementary requirements)

| Course                            | Hours | Grade | Course         | Hours | Grade |
|-----------------------------------|-------|-------|----------------|-------|-------|
| Biology 1113 (or H1115)           | 4     |       | Chemistry 2510 | 4     |       |
| Biology 1114 (or H1116)           | 4     |       | Chemistry 2520 | 4     |       |
| Chemistry 1610 (or 1210 or 1910H) | 5     |       |                |       |       |
| Chemistry 1620 (or 1220 or 1920H) | 5     |       |                |       |       |
| Math 1151.01                      | 5     |       |                |       |       |

**Part B. Minor 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 |
|-------------------------|-------|-------|--|-------|-------|
| Biochemistry 5613       | 3     |       | Add'l biochemistry or<br>related physical or<br>biological science | 2     |       |
| Biochemistry 5614       | 3     |       |  |       |       |
| Biochemistry 5615       | 3     |       |  |       |       |
| Biochem 5621 (or H5621) | 4     |       |  |       |       |
|                         |       |       |  |       |       |
|                         |       |       |  |       |       |
|                         |       |       |  |       |       |
|                         |       |       |  |       |       |

**\_\_\_\_\_** (15 + optional hours)

*Total of Part B only*

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

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

See back for information about minor programs.

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

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

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

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### 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. This is especially true for the Biochemistry Minor because fewer course requirements are involved. 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. In general, students will be strongly encouraged to complete the prerequisites in biology, chemistry, and mathematics during their first and second years at Ohio State. The biochemistry core series typically begins in the third year within the current quarter system. Current students, who have completed the necessary prerequisites are strongly encourage to complete the three-quarter biochemistry core series (Biochemistry 613, 614, and 615) this coming academic year (2011/12). Those who will be unable to do so, will be strongly encouraged to begin this series by enrolling in the special "bridge" offering of Biochemistry 613 during the Spring Quarter of 2012 and then proceed with the semester versions of the series (Biochemistry 5614 and 5615) during the following year (2012/13). Other students can begin the 3-semester series under the new system initiated during the Autumn Semester of 2012. The transition strategy can be summarized as follows:

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

**Current Juniors (AY 10/11):** Again, few issues should arise with current students being able to complete the biochemistry series under quarter system within their final years.

**Current Sophomores (AY 10/11):** This group should be able to complete series next year (as juniors) under the quarter system and are currently being contacted by their faculty academic advisor and strongly advised to make plans to do so. Student who should fail 613, which is currently offered only in the Autumn Quarter, will have the opportunity to retake a "bridge" offering of this course during the spring of 2012. These students would then continue the semester versions of 614 and 615 (*i.e.* 5614 and 5615) during their senior year.

**Current Freshmen (AY 10/11):** This group could begin the Biochemistry 561x series under the semester system in their junior and senior years. They shouldn't encounter transition issues with chemistry and mathematics prerequisites as these should be completed under the quarter system in the next two years. However, this group of students is being contacted on an ongoing basis by their faculty academic advisor and strongly encouraged to begin this core biochemistry series in their sophomore year by taking the extra "bridge" quarter version of Biochemistry 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.

**Entering Freshmen for AY 11/12:** Students will be contacted early in the fall of 2011 and provided detailed information regarding the transition to semesters, instructions and contact information for their academic advisor(s). Students will be advised to complete their mathematics and general chemistry prerequisite requirements under the current quarter systems during their first year. Their organic chemistry prerequisites can straightforwardly be completed under the semester system beginning in their second year along with the initiation of the prescribed semester plan for all biochemistry course requirements, starting the 5613 during the Spring Semester. .

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**Entering Freshmen for AY 12/13:** This group 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 about 2.5 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 and to provide sufficient time to enroll in courses associated with their major. See *Appendix “Example - Four-Year Semester Schedule....”* for a general 4-year schedule under a complete semester system. Although not advisable, students could delay entering the biochemistry core series (Biochemistry 5613, 5614, and 5615) until the Spring Semester of their third (junior) year. However, difficulties could arise if the student fails Biochemistry 5613 and perhaps in scheduling the additional required course in biochemistry, physical or biological science.

**Transition issues related to the Chemistry, Physics, and Mathematics prerequisite sequences.** In the event that a student has only partially completed Chemistry, Mathematics, or Physics sequences before the conversion to semesters, we will advise the student to follow the respective department’s transition plans for those sequences.

**Appendix. EXAMPLE - FOUR-YEAR SEMESTER SCHEDULE FOR THE BIOCHEMISTRY MINOR**

**FRESHMAN YEAR:**

| <i>Autumn Semester:</i>          | <i>cr hr</i> | <i>Spring Semester:</i>              | <i>cr hr</i> | <i>May Term:</i> |
|----------------------------------|--------------|--------------------------------------|--------------|------------------|
| Biological Sciences 100 (Survey) | 1            |                                      |              | (TBD)            |
| General Chemistry I (1210/1610)  | 5            | General Chemistry II (1220/1620)     | 5            |                  |
| Calculus I (Math 1151.01)        | 5            | Biology II (1114)*                   | 4            |                  |
| Biology I (1113)                 | 4            | GEC-"Writing Level 1" (English x110) | 3            |                  |
| GE, Elective, Course in Major    | <u>3</u>     | GE, Elective, Course in Major        | <u>3</u>     |                  |
|                                  | 18           |                                      | 15           |                  |

**SOPHOMORE YEAR:**

| <i>Autumn Semester:</i>       |           | <i>Spring Semester:</i>       |           | <i>May Term:</i> |
|-------------------------------|-----------|-------------------------------|-----------|------------------|
| Organic Chemistry I (2510)    | 4         | Organic Chemistry II (2520)   | 4         | (TBD)            |
| GE, Elective, Course in Major | up to 12  | Biochemistry I (5613)         | 3         |                  |
|                               | <u>16</u> | GE, Elective, Course in Major | up to 9   |                  |
|                               |           |                               | <u>16</u> |                  |

**JUNIOR YEAR:**

| <i>Autumn Semester:</i>       |           | <i>Spring Semester:</i>       |           | <i>May Term:</i> |
|-------------------------------|-----------|-------------------------------|-----------|------------------|
| Biochemistry II (5614)        | 3         | Biochemistry III (5615)       | 3         | (TBD)            |
| GE, Elective, Course in Major | up to 12  | Biochemistry Lab (5621)       | 4         |                  |
|                               | <u>15</u> | GE, Elective, Course in Major | up to 9   |                  |
|                               |           |                               | <u>16</u> |                  |

**SENIOR YEAR**

| <i>Autumn Semester:</i>                          |                  | <i>Spring Semester:</i>       |           | <i>May Term:</i>                  |
|--|------------------|-------------------------------|-----------|-----------------------------------|
| Course in biochemistry, physical or biological : | 2                |                               |           | (TBD)                             |
| GE, Elective, Course in Major                    | up to 12         | GE, Elective, Course in Major | 15        |                                   |
|  | <u>14</u>        |                               | <u>15</u> |                                   |
|  |                  |                               | <u>15</u> | scrhr:                            |
|  |                  |                               | <u>62</u> | minor: 15 (>12 scrhr required)    |
| Total Credit hours                               | <u><u>63</u></u> |                               |           | overall: 125 (>120 crhr required) |

\* Students with advanced placement credit should be advised to take Biology 1114 before beginning the core Biochemistry series (5613-5615)

**NOTE:** Although not advisable, a student could begin the biochemistry core series (Biochemistry 5613, 5614, and 5615) during the Spring Semester of their third (junior) year, however, this could generate issues with the scheduling of the required additional course in biochemistry, physical or biological science.

**Appendix B\_ Biochemistry Minor - Conversion to Semesters (version 6/3/2011)**

| 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>Prerequisites (some may double-count in GEC)</b>   | Biology 113/H115  | Introductory Biology I                       | 5                        | Biology 1113  | Introductory Biology I                     | 4                       |                                  |                      |
|   | Biology 114/H116  | Introductory Biology II                      | 5                        | Biology 1114  | Introductory Biology II                    | 4                       |                                  |                      |
|   | Chemistry 121 or 161  | General Chemistry I                          | 5                        |   |  |                         |                                  |                      |
|   | Chemistry 122 or 162  | General Chemistry II                         | 5                        | Chemistry 1210 or 1610  | General Chemistry I                        | 5                       |                                  |                      |
|   | Chemistry 123 or 163  | General Chemistry III                        | 5                        | Chemistry 1220 or 1620  | 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                       |                                  |                      |
|   | Chemistry 251   | Organic Chemistry I                          | 4                        |   |  |                         |                                  |                      |
|   | Chemistry 252   | Organic Chemistry II                         | 4                        | Chemistry 2510  | Organic Chemistry I                        | 4                       |                                  |                      |
|   | Chemistry 253   | Organic Chemistry III                        | 4                        | Chemistry 2520  | Organic Chemistry II                       | 4                       |                                  |                      |
| <b>Total Prerequisites Quarter Credit Hours:</b>  |   |  | <b>47</b>                | <b>Total Prerequisites Semester Units:</b>                                    |  | <b>31</b>               | <b>31</b>                        | <b>+0</b>            |
| <b>Core major requirements in department</b>  | Biochemistry 613  | Biochemistry and Molecular Biology I         | 4                        | Biochemistry 5613   | Biochemistry and Molecular Biology I       | 3                       |                                  |                      |
|   | Biochemistry 614  | Biochemistry and Molecular Biology II        | 4                        | Biochemistry 5614   | Biochemistry and Molecular Biology II      | 3                       |                                  |                      |
|   | Biochemistry 615  | Biochemistry and Molecular Biology III       | 4                        | Biochemistry 5615   | Biochemistry and Molecular Biology III     | 3                       |                                  |                      |
|   | Biochemistry 521 (H521)   | Introductory Biological Chemistry Laboratory | 5                        | Biochemistry 5621 (H5621)   | Biochemistry &Molecular Biology Laboratory | 4                       |                                  |                      |
|   | Additional course in biochemistry or a related physical or biological science |  | 3                        | Additional course in biochemistry or a related physical or biological science |  | 2                       |                                  |                      |
| <b>Total Core Major (Dept) Quarter Credit Hours:</b>  |   |  | <b>20</b>                | <b>Total Core Major (Dept) Semester Units:</b>                                |  | <b>15</b>               | <b>13</b>                        | <b>+2</b>            |
| <b>Total credit hours/units in major and prerequisites</b>  |   |  | <b>67</b>                |   |  | <b>46</b>               | <b>44</b>                        | <b>+2</b>            |
| <b>Minor program percentage of minimum hours/units for degree (using 180 quarter credit hours and 120 semester units)</b> |   |  | <b>37%</b>               |   |  | <b>38%</b>              |                                  |                      |