

DEC 19 2006

OFFICE OF THE  
SENATE COUNCIL

**UNIVERSITY OF KENTUCKY  
REQUEST FOR CHANGE IN UNDERGRADUATE PROGRAM**

|                                     |  |                    |                               |
|-------------------------------------|--|--------------------|-------------------------------|
| Program:                            | Bachelor of Science with a Major in Chemistry                |                    |                               |
| Formal Option :                     | Biochemistry Option or Track                                 | or Specialty Field | (if applicable)               |
| Department (if applicable):         | Department of Chemistry                                      |                    |                               |
| College (if applicable):            | Arts & Sciences  |                    |                               |
| Degree title:                       | Bachelor of Science  | Bulletin pp:       | 101-103 in 2005-2006 Bulletin |
| CIP Code:                           |  | UK ID No.:         | HEGIS CODE:                   |
| Accrediting Agency (if applicable): | American Chemical Society (ACS) ( <i>certifies degrees</i> ) |                    |                               |

**I. PROPOSED CHANGE(S) IN PROGRAM REQUIREMENTS**

1. Particular University Studies Requirements or Recommendations for this program

|   | <u>Current</u> | <u>Proposed</u> |
|---|----------------|-----------------|
| English writing                         |                | No change       |
| Communication:                          |                | No change       |
| Mathematics:                            |                | No change       |
| Area I (Natural Science)                |                | No change       |
| Area II (Social Science)                |                | No change       |
| Area III (Humanities)                   |                | No change       |
| Area IV (Cross-disciplinary component)  |                | No change       |
| Area V (Non-western cultural component) |                | No change       |

2. College Depth and Breadth of Study Requirements (if applicable) (including particular courses required or recommended for this program) NOTE: To the extent that proposed changes in 2. through 6. involve additional courses offered in another program, please submit correspondence with the program(s) pertaining to the availability of such courses to your students.

| <u>Current</u> | <u>Proposed</u> |
|----------------|-----------------|
|                | No change       |
|                | No change       |
|                | No change       |
|                | No change       |

3. Premajor or Preprofessional Course Requirements (if applicable)

| <u>Current</u>           | <u>Proposed</u>                |
|--------------------------|--------------------------------|
| MA 113 & 114 (8 cr)      | MA 113 & 114 (8 cr)            |
| CHE 105, 107, 115 (9 cr) | CHE 105, 107, 111, 113 (9 cr)  |
|                          | BIO 150, 151, 152, 153 (10 cr) |

Total Hours: 27

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|  |                       |            |                 |   |     |   |         |    |
|--|-----------------------|------------|-----------------|---|-----|---|---------|----|
| 4. Credit Hours Required   | <u>Current</u>        |            | <u>Proposed</u> |   |     |   |         |    |
|  | 121                   |            | 122             |   |     |   |         |    |
| a. Total Required for Graduation:  | 120                   |            |                 |   |     |   |         |    |
| b. Required by level:  |                       |            |                 |   |     |   |         |    |
|  | 100                   | 27<br>+USP | 200             | 25  | 300 | 3 | 400-500 | 24 |
| c. Premajor or Preprofessional(if applicable)                                | 27                    |            |                 | f. Hours Needed for a Particular Option or Specialization (if applicable) |     |   | 21      |    |
| d. Field of Concentration (if applicable)                                    | 56                    |            |                 | g. Technical or Professional Support Electives (if applicable)            |     |   | 4 (MFO) |    |
| e. Division of Hours Between Major Subject and Related Field (if applicable) | MAJOR/RELATED = 39/17 |            |                 | h. Minimum Hours of Free or Supportive Electives (Required)               |     |   | 9       |    |

### 5. Major or Professional Course Requirements

| <u>Current</u>  | <u>Proposed</u>  |
|---|--|
| CHE 226, 230, 231, 232, MA 213, 322, PHY 231, 241, 232, 242 | CHE 226, 230, 231, 232, MA 213, PHY 231, 241, 232, 242 |
| CHE 440G, 441G, 450G  | BIO 308 or 315.  |
| CHE 522, 532, 533, 547, 550 or 552, 572 (2x)                | CHE 440G, 441G, 450G                                   |
| Major Field Options   | CHE 522 or 532 + 533, 550, 552, 554, 572 (2x)          |
|   | Major Field Options (preferably CHE 395)               |

### 6. Minor Requirements (if applicable)

| <u>Current</u> | <u>Proposed</u> |
|----------------|-----------------|
|                |                 |
|                |                 |
|                |                 |

Total Hours: **56**

7. Rationale for Change(s): (If rationale involves accreditation requirements, please include specific references to those requirements.)

ARTS AND SCIENCES  
EDUCATIONAL POLICY COMMITTEE  
INVESTIGATOR REPORT

INVESTIGATING AREA: Natural & Math. Sci. COURSE, MAJOR, DEGREE or PROGRAM: Chemistry BS with Option in Biochemistry

DATE FOR EPC REVIEW: 10/31/2006

CATEGORY: NEW, CHANGE, DROP

INSTRUCTIONS: This completed form will accompany the course application to the Graduate/Undergraduate Council(s) in order to avoid needless repetition of investigation. The following questions are included as an outline only. Be as specific and as brief as possible. If the investigation was routine, please indicate this. The term "course" is used to indicate one course, a series of courses or a program, whichever is in order. Return the form to Leonidas Bachas Associate Dean, 275 Patterson Office Tower for forwarding to the Council(s). ATTACH SUPPLEMENT IF NEEDED.

1. List any modifications made in the course proposal as submitted originally and why. **No modifications were made because the proposal is well-constructed, timely, and a welcome addition to the Chemistry department offerings.**
2. If no modifications were made, review considerations that arose during the investigation and the resolutions. **None.**
3. List contacts with program units on the proposal and the considerations discussed therein. **None.**
4. Additional information as needed. **None.**

5. ~~A&S Area Coordinator Recommendation:~~  
A&S Area Coordinator Recommendation:

APPROVE, APPROVE WITH RESERVATION, OR DISAPPROVE

6. A&S Education Policy Committee Recommendation:

APPROVE, APPROVE WITH RESERVATION, OR DISAPPROVE

7. Phil Bonner  
A&S Educational Policy Committee, Phil Bonner

Date: 11/14/2006

11/14/2006

File: MInvestigatorRpt

**UNIVERSITY SENATE REVIEW AND CONSULTATION SUMMARY SHEET**

**Proposal Title:** *Bachelor of Science with a Major in Chemistry – Biochemistry Option*  
**Name/email/phone for proposal contact:** *Carolyn P. Brock, Director of Undergraduate Studies*  
*cpbrock@uky.edu, 257-1959*

**Instruction:** To facilitate the processing of this proposal please identify the groups or individuals reviewing the proposal, identify a contact person for each entry, provide the consequences of the review (specifically, approval, rejection, no decision and vote outcome, if any) and please attach a copy of any report or memorandum developed with comments on this proposal.

| Reviewed by: (Chairs, Directors, Faculty Groups, Faculty Councils, Committees, etc) | Contact person Name (phone/email)                    | Consequences of Review:   | Date of Proposal Review | Review Summary Attached? (yes or no) |
|---|--|---|-------------------------|--------------------------------------|
| Department Faculty  | Carolyn P. Brock, DUS<br>257-1959<br>cpbrock@uky.edu | Approved after review and revision by the Undergraduate Committee | 10/5/2006               | No                                   |
| Department Chair  | Steven W. Yates<br>257-7082<br>yates@uky.edu         | Approved after unanimous vote of the faculty                      | 10/12/2006              | No                                   |
|   |  |   |                         |                                      |
|   |  |   |                         |                                      |

Given the ever-increasing importance of the science at the interface of chemistry and biology, which can be called either biochemistry or biological chemistry, the Department of Chemistry wishes to add a second formal track or option to the Bachelor of Science degree program with a major in Chemistry. If we were to call our current approved degree a "BS in Chemistry - Chemistry Option", the second track would then be called a "BS in Chemistry - Biochemistry Option". These names are compatible with those recommended by the American Chemical Society (ACS), which is the organization that authorizes us to label degrees as being "ACS Certified".

To the best of our knowledge, there is no current undergraduate degree program in biochemistry or biological chemistry at the University of Kentucky. We believe that there is substantial evidence of sustainable student demand for a degree specialty in this interfacial area. We do also wish to retain our current BS degree ("Chemistry Option").

Requirements for an ACS Certified Degree with Biochemistry emphasis are available ([http://www.chemistry.org/portal/resources/ACS/ACSContent/education/cpt/guidelines\\_spring2003.pdf](http://www.chemistry.org/portal/resources/ACS/ACSContent/education/cpt/guidelines_spring2003.pdf)). We found it was necessary to change only the premajor requirements and some specialized or support courses to accommodate the proposed Biochemistry Option within the current BS.

It is also possible for our majors to complete a BA degree in chemistry, our alternate and much more flexible degree track, by taking courses in biology, biochemistry, and biological chemistry. The BA program requires 21 credits specified as Major Field Options (MFO) that are essentially "technical electives" in place of the specified 400- and 500-level courses that are part of the BS program. However, some students view a BA degree, even if it includes many science and math courses, as less desirable than a BS degree. Moreover, a student would effectively have to take almost all of the courses specified in our BS degree as well as additional math courses to have a BA degree that could be certified by the American Chemical Society. This is precisely why our BA and BS curricula are so very different. If a student is awarded the latter, it is automatically certified by the ACS. Certification can be of great benefit to the graduate depending on his or her career goals.

This major distinction between our BS and BA degrees has existed since the latter was created over a quarter of a century ago. The distinction has worked very well for most of our students. The BS is for graduates who are very serious about a career in chemistry. The BA is for those students whose ultimate career goals are more likely to be in related fields -- medical or dental school, technical librarian, patent lawyer, technical salesman, high-school teacher, environmentalist. The BA provides a solid basic foundation in chemistry and the flexibility to include a large number and variety of other science and math courses for much greater breadth. We have also had, however, a number of majors who were very serious about chemistry but were intent on specializing in biological chemistry. These students sometimes chose to complete a BA major but with extra mathematics and chemistry courses. It is primarily for the latter students that the new option is designed.

We wish to continue to have both our BS degrees, "Chemistry Option" and "Biochemistry Option", automatically certified by the ACS. A major factor with which we have to contend in designing an overall curriculum is that the American Chemical Society has defined only a few allowable Option tracks other than the normal chemistry degree, and they impose many strict requirements for what must be in the curriculum for certification. We must therefore design a curriculum that not only meets our faculty's expectations and USP and A&S requirements, but also meets ACS certification standards.

The proposal we send to you represents our best efforts at meeting these many diverse requirements, as well as remaining roughly equivalent to our Chemistry-Option BS. The major differences between the two Options are as follows: The Biochemistry Option does not require (a) the fourth semester of math nor (b) several 500-level required and elective CHE courses. In their place we have added (a) the BIO 150-153 sequence, (b) one advanced BIO class, and (c) a second semester of our Biological Chemistry lecture plus a new Biological Chemistry laboratory course, both at the 500 level. The net change is one additional credit in the required minimum for the Biochemistry Option (total is then 122 credits). Furthermore, on balance, the new option is about as rigid and structured as the existing Chemistry Option.

We therefore request your careful consideration and approval of this proposal to add a second "official" option or track within our Bachelor of Science degree with a Major in Chemistry.

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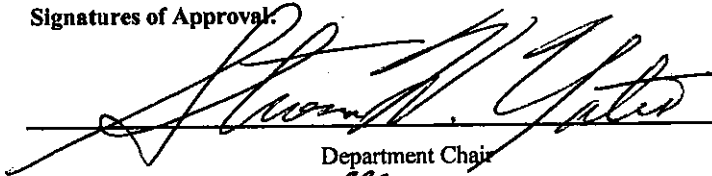
8. List below the typical semester by semester program for a major.

| Current  | Proposed  |
|--|---|
| See our current 4-yr BS-Chemistry Option attached<br>(Option to be retained) | See our proposed 4-yr BS-Biochemistry Option attached |
|  |   |
|  |   |
|  |   |

Will this program be printed in the Bulletin?

Yes:  No:

Signatures of Approval:

  
\_\_\_\_\_

Department Chair

10/18/06

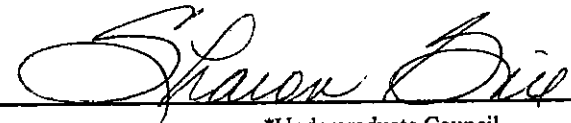
Date

  
\_\_\_\_\_

Dean of the College

10/31/06

Date

  
\_\_\_\_\_

\*Undergraduate Council

Date of Notice to the Faculty

12/12/06

Date

\_\_\_\_\_

\*University Studies

Date

\_\_\_\_\_

\*Graduate Council

Date

\_\_\_\_\_

\*Academic Council for the Medical Center

Date

\_\_\_\_\_

\*Senate Council

Date of Notice to Univ. Senate

\*If applicable, as provided by the Rules of the University Senate

\_\_\_\_\_  
ACTION OTHER THAN APPROVAL:

# Curriculum Leading to the Degree of Bachelor of Science with a Major in Chemistry

## **Biochemistry Option**

### Freshman: First Semester

|                                 |    |
|---------------------------------|----|
| CHE 105 General Chemistry I     | 3  |
| CHE 111 General Chemistry Lab I | 1  |
| MA 113 Calculus                 | 4  |
| ENG 104 Writing                 | 4  |
| University Studies              | 3  |
|                                 | 15 |

### Freshman: Second Semester

|                                  |    |
|----------------------------------|----|
| CHE 107 General Chemistry II     | 3  |
| CHE 113 General Chemistry Lab II | 2  |
| MA 114 Calculus II               | 4  |
| BIO 150 Biology I                | 3  |
| BIO 151 Biology Lab I            | 2  |
|                                  | 14 |

### Sophomore: First Semester

|                             |    |
|-----------------------------|----|
| CHE 230 Organic Chemistry I | 3  |
| BIO 152 Biology II          | 3  |
| BIO 153 Biology II Lab      | 2  |
| MA 213 Calculus III         | 4  |
| PHY 231 Univ Physics I      | 4  |
| PHY 241 Univ Phys Lab I     | 1  |
|                             | 17 |

### Sophomore: Second Semester

|                               |    |
|-------------------------------|----|
| CHE 231 Organic Chemistry Lab | 2  |
| CHE 232 Organic Chemistry II  | 3  |
| CHE 226 Analytical Chemistry  | 3  |
| PHY 232 Univ Physics II       | 4  |
| PHY 242 Univ Phys Lab II      | 1  |
| ENG 2XX English Writing Req   | 3  |
|                               | 16 |

### Junior: First Semester

|                                |          |
|--------------------------------|----------|
| CHE 440G Intro. Physical Chem. | 4        |
| CHE 522 Instrumental Analysis  | 4        |
| or                             |          |
| CHE 532 Spec ID Organic        | 2        |
| CHE 550 Biological Chemistry I | 3        |
| BIO 315 or 308                 |          |
| Cell Biology or Microbiology   | 3        |
| University Studies             | 3        |
|                                | 17 or 15 |

### Junior: Second Semester

|                                  |          |
|----------------------------------|----------|
| CHE 533 Qualitative Lab (if 532) | 2        |
| CHE 552 Biological Chemistry II  | 3        |
| CHE 554 Biological Chem. Lab     | 2        |
| University Studies               | 6        |
| Foreign Language                 | 4        |
|                                  | 15 or 17 |

### Senior: First Semester

|                               |    |
|-------------------------------|----|
| CHE 450G Practical Inorg Chem | 4  |
| Major Field Option            | 2  |
| CHE 572 Seminar               | 1  |
| University Studies            | 3  |
| Foreign Language              | 4  |
|                               | 14 |

### Senior: Second Semester

|                             |    |
|-----------------------------|----|
| CHE 441G Physical Chem. Lab | 2  |
| Major Field Option          | 2  |
| CHE 572 Seminar             | 1  |
| Foreign Language            | 3  |
| Elective (A&S)              | 6  |
|                             | 14 |

Total Minimum Credits = 122

ACS Core Classes (need 28 credits) = 30  
 ACS Advanced Classes (need 6 credits) = 12  
 Other Requirements for Biochemistry Option

ACS Lab (need 7 credits, 325 hours) = 9 (375)  
 ACS Lab (total to 500 hours) = 4 (total to 555)  
 Additional ACS Requirements

### **Notes**

CHE 442G (Thermodynamics and Kinetics; 3 hrs) may be substituted for CHE 440G (Introductory Physical Chemistry; 4 hrs).

BIO 304 (Genetics; 4 hrs) may replace BIO 308 (Microbiology; 3 hrs) or BIO 315 (Cell Biology; 3 hrs).

### **Acceptable Major Field Options**

Major Field Option (or, MFOs): Major Field Options must be chosen from the following: CHE 395; any 500-level chemistry course except those required. CHE 395 is strongly recommended for students having a minimum 3.0 GPA in chemistry courses.