

November 9, 2016

MEMORANDUM

TO: State Board of Regents

FROM: David L. Buhler

SUBJECT: Weber State University – Bachelor of Science in Biochemistry

Issue

Weber State University (WSU) requests approval to offer a Bachelor of Science (BS) in Biochemistry effective in spring 2017. The institutional Board of Trustees approved the degree on February 2, 2016.

Background

WSU has offered a BS in Chemistry “Option 2” program, with some flexibility to emphasize biochemistry over other aspects of chemistry, for students interested in biochemistry and medicine, dentistry, and veterinary sciences. The proposed BS in Biochemistry represents a significant revision and would replace the existing Chemistry “Option 2,” providing even greater flexibility and deliberate focus on biochemistry, as well as adding American Chemical Society certification. The proposed degree would require a foundation course in each of the five main branches of chemistry (analytical, biochemistry, inorganic, organic, and physical), with students also required to take further courses in organic chemistry, biochemistry, medicinal chemistry, and cell biology or microbial genetics; elective credits to complete the biochemistry major would be selected from a variety of designated courses in chemistry, microbiology, zoology, or botany.

The most recent institutional review of the chemistry program at WSU resulted in a recommendation to develop a biochemistry degree. Biochemistry is seen as an excellent option for students interested in health professional schools, including medicine, physician assistant, pharmacy, dentistry, etc. Baccalaureate graduates in biochemistry could also choose to pursue graduate studies. In terms of the employment outlook, the U.S. Bureau of Labor Statistics predicts 19% growth in jobs for biochemists from 2012 to 2022, versus 12% average job growth for all occupations. According to BioUtah, an association serving the life science industry in Utah, biology-related jobs account for 2.3% of all jobs in Utah, with average wages at 150% of the average for all jobs.

The proposed BS in Biochemistry would be based in the Department of Chemistry at WSU. Existing courses, funding, personnel, and library and information resources are sufficient to launch the program, and the new Tracy Hall Science Center features modern labs and new equipment. It is projected that biochemistry graduates would eventually account for more than half the annual graduates in the Department of Chemistry.

Policy Issues

The proposed degree has been developed and reviewed in accordance with processes established by Weber State University and the Board of Regents. The Utah System of Higher Education (USHE) Chief Academic Officers and appropriate faculty at other USHE institutions reviewed and are supportive of Weber State University's request to offer a BS in Biochemistry. There are no additional policy issues relative to approval of this program.

Commissioner's Recommendation

The Commissioner recommends the Regents approve the request by Weber State University to offer a Bachelor of Science in Biochemistry.

David L. Buhler
Commissioner of Higher Education

DLB/GVB
Attachment

Utah System of Higher Education Program Description - Full Template

Section I: The Request

Weber State University requests approval to offer the following Baccalaureate degree(s): Biochemistry effective Winter 2017. This program was approved by the institutional Board of Trustees on February 2, 2016.

Section II: Program Proposal

Program Description

Present a complete, formal program description.

Biochemistry is a rapidly-growing area of chemistry, with potential employment opportunities in areas such as health professions, pharmaceutical sciences, biotechnology, forensics, research, food science, and cosmetic sciences, along with abundant graduate-level opportunities. For the decade spanning 2012 to 2022, the U.S. Bureau of Labor Statistics predicts a 19% growth in jobs for biochemists, which is significantly faster than the predicted national average job growth for the same period at about 12%. The proposed Biochemistry program is a significant revision of the existing Chemistry Option 2 major and is designed to address the current and future market demand for biochemists and to better service the goals and career aspirations of students. The program is designed to afford students maximum flexibility while meeting the current program certification requirements of the American Chemical Society (ACS) for baccalaureate-level training.

The key aspects of the new program are: five foundation courses will be required, one in each of the five main branches of chemistry (analytical, organic, biochemistry, physical chemistry, and inorganic); beyond the foundational courses, biochemistry students will be required to take Organic Chemistry II + lab, Biochemistry II, Biotechniques, Medicinal Chemistry, and Cell Biology (Zoology) or Microbial Genetics (Microbiology); elective credits may be filled by a variety of designated courses in chemistry, microbiology, zoology, or botany.

Consistency with Institutional Mission

Explain how the program is consistent with the institution's Regents-approved mission, roles, and goals. Institutional mission and roles may be found at higheredutah.org/policies/policy312/.

The proposed Biochemistry program is consistent with Weber State University's mission to provide baccalaureate degrees that are responsive to student demand and community needs. Biochemistry is a vigorously-growing field of science, with excellent career opportunities for graduates. Consistent with the institutional goal of keeping costs down for students and minimizing institutional costs for growing a program, the new major program in Biochemistry builds on already-existing resources, so there is no cost for expanding the major in the way proposed. The program will also keep a long tradition of student-focused education in Chemistry, with opportunities for students to take part in undergraduate research and other high-impact activities. Thus, offering a Biochemistry program is consistent with the institution's responsibility to contribute to the quality of life, to offer accessible and effective education, and to promote economic development at the local and state levels.

Section III: Needs Assessment

Program Rationale

Describe the institutional procedures used to arrive at a decision to offer the program. Briefly indicate why such a program should be initiated. State how the institution and the USHE benefit by offering the proposed program.

The existing Option 2 Chemistry major currently serves students interested in biochemistry and medicine, dentistry, and veterinary sciences because it provides some flexibility to emphasize biochemistry over some other aspects of chemistry. However, the Option 2 major is currently not an American Chemical Society (ACS) certified chemistry program. As noted, Biochemistry is a rapidly-growing area of chemistry with potential employment opportunities in areas such as health professions, pharmaceutical sciences, biotechnology, forensics, research, food science, and cosmetic sciences. To help meet this current and future need for biochemists and to better serve the goals and career aspirations of students, this new degree program is being proposed to replace the Chemistry Option 2 emphasis. Key aspects of the proposed program are

outlined above in the Program Description.

Labor Market Demand

Provide local, state, and/or national labor market data that speak to the need for this program. Occupational demand, wage, and number of annual openings information may be found at sources such as Utah DWS Occupation Information Data Viewer (jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do) and the Occupation Outlook Handbook (www.bls.gov/oco).

For the decade spanning 2012 to 2022, the U.S. Bureau of Labor Statistics predicts a 19% growth in jobs for biochemists, which is significantly faster than predicted national job growth average of 12%. This need is supported by a cursory review of current employment advertisements along the Wasatch Front; a recent informal survey found 20 listings for biochemistry-related positions. There are more than 30 pharmaceutical, biotechnology, and biochemistry-related laboratories and manufacturing businesses along the Wasatch Front. According to BioUtah, biology-related jobs represent 2.3% of all Utah jobs with average wages at 150% of the average for all jobs.

Student Demand

Provide evidence of student interest and demand that supports potential program enrollment. Use Appendix D to project five years' enrollments and graduates. Note: If the proposed program is an expansion of an existing program, present several years enrollment trends by headcount and/or by student credit hours that justify expansion.

Institutional program review at Weber State University helps ensure the quality and rigor of the Chemistry program. Program review teams are composed primarily of experts from beyond campus. The most recent program review resulted in the recommendation that the WSU Department of Chemistry develop a Biochemistry program.

"If one curricular track is Biochemistry we suggest that the department market this program to students interested in the pre-health professions. Because the department generally places a relatively small number of its chemistry graduates in medical or other health professional schools we believe this is an undervalued area with considerable growth potential. The department is encouraged to build up these very modest successes and expand its contribution to advising of students interested in health related careers. National statistics show that chemistry and biochemistry majors have a higher success rate (typically 45-50%) for admission to medical schools than majors in other science disciplines (typically biology, microbiology, etc. are 35-40%). Additionally, changes to the Medical school Admissions Test (MCAT) are increasing the emphasis on biochemistry starting in 2015. The presence of a BS biochemistry track with a Foundation of Biochemistry course will likely attract many students to the new major who would be new science majors not just shifted over from biology. We think the faculty should market the department as a great option for students interested in the pre-health professions. The department might want to develop a 4 year curricular plan for chemistry majors seeking admission to professional schools and place a poster in the hallway marketing this opportunity, celebrating successes of recent students, and citing the national data mentioned above. This poster should also mention that a chemistry or biochemistry major is a great backup option in case a student does not get admitted or chooses not to attend health professional school."

Informal surveys of students at WSU have shown enthusiastic support of a Biochemistry program. As noted in the review team's statement, Biochemistry is an excellent option for students interested in health professional schools, including medical school, physician assistant school, pharmacy school, dental school, etc.

Similar Programs

Are similar programs offered elsewhere in the USHE, the state, or Intermountain Region? If yes, identify the existing program(s) and cite justifications for why the Regents should approve another program of this type. How does the proposed program differ from or compliment similar program(s)?

Two institutions in the region have introduced Bachelor of Science biochemistry programs during the last 12 years. Utah State University's Department of Chemistry and Biochemistry introduced a BS in Biochemistry in 2005. Since that time they have experienced a threefold increase in the total number of majors in the department, with the number of biochemistry majors now outnumbering the chemistry majors. They continue to see a need to provide more capacity for biochemistry majors and have indicated their support for WSU's biochemistry program, which will likely help fill the need for more graduate students in their

biochemistry graduate program.

BYU-Idaho introduced a biochemistry program three years ago and has observed a doubling of their chemistry and biochemistry students in that time, with biochemistry students now representing about 60% of all chemistry department majors. This is a nationwide trend and similar examples are common.

One difference between the proposed WSU Biochemistry program and those at BYU and USU is that the WSU program is intentionally an ACS-certified degree track. While the proposed program is similar in many regards to those at USU and BYU, the differences arise because of the ACS certification.

Undergraduate programs in Biochemistry are most often housed in departments of Chemistry or Chemistry and Biochemistry, with occasional examples of programs housed in biology departments or medical schools. Thus, it is appropriate to house the biochemistry program in the Department of Chemistry at WSU. While the major will be housed within the Department of Chemistry, the departments of Microbiology, Zoology, and Botany are supportive of the new program.

Collaboration with and Impact on Other USHE Institutions

Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in [higherutah.org/policies/policyr315/](http://higheredutah.org/policies/policyr315/). Assess the impact the new program will have on other USHE institutions. Describe any discussions with other institutions pertaining to this program. Include any collaborative efforts that may have been proposed.

The WSU Department of Chemistry has consulted with the Department of Chemistry at the University of Utah and with the Department of Chemistry and Biochemistry at Utah State University. Both institutions are supportive of the proposed Biochemistry program at WSU. One important reason for the support of USU and the University of Utah is that this program will likely provide a significant number of BS Biochemistry graduates interested in pursuing graduate degrees at Utah State University and the University of Utah.

No significant loss of students in other USHE schools is anticipated due to the regional nature of Weber State's student population. WSU's service area includes Weber, Davis, and Morgan counties, and WSU students are predominantly from these counties, with no other 4-year USHE schools drawing a significant percentage of students from the same region. This reflects the fact that a majority of WSU students commute from home and attend the university nearest their home.

External Review and Accreditation

Indicate whether external consultants or, for a career and technical education program, program advisory committee were involved in the development of the proposed program. List the members of the external consultants or advisory committee and briefly describe their activities. If the program will seek special professional accreditation, project anticipated costs and a date for accreditation review.

The American Chemical Society (ACS) promotes excellence in chemistry education for undergraduate students through approval of baccalaureate chemistry programs. The WSU Department of Chemistry has maintained ACS-approved status for almost 50 years. The design of the proposed Biochemistry program satisfies the ACS requirements for an approved program and, as such, will be an ACS-approved program. The Biochemistry program will undergo a rigorous six-year review cycle to confirm that it continues to maintain excellence and remains consistent with ACS guidelines.

Section IV: Program Details

Graduation Standards and Number of Credits

Provide graduation standards. Provide justification if number of credit or clock hours exceeds credit limit for this program type described in R401-3.11, which can be found at [higherutah.org/policies/R401](http://higheredutah.org/policies/R401).

Grade Requirements: Average GPA of 2.00 or better in courses within the major.

Credit Hour Requirements: A total of 120 credit hours is required for graduation. A minimum of 56 credit hours of chemistry and

chemistry-related course work is required, with a further 18 credits in required cognate courses outside of chemistry. A total of 40 upper-division credit hours (in courses numbered 3000 and above) is required for all Biochemistry majors to fulfill WSU graduation requirements; 36 upper-division credit hours are earned while completing the Biochemistry program requirements.

General Education Requirements: The following courses are required for the Biochemistry major and also satisfy general education requirements for the physical sciences: CHEM 1210 and PHYS 2010 or PHYS 2210.

Expected Levels of Achievement/ Program Outcomes: At the end of their study at WSU, students in this program will have knowledge and comprehension of the core concepts of Biochemistry. These core concepts will be introduced in the General Chemistry 1210/1220 series and will be further developed in five foundation classes in the specific areas of Organic Chemistry, Biochemistry, Analytical Chemistry, Physical Chemistry, and Inorganic Chemistry. The key learning outcomes for each course are described in the catalog. After completing the set of foundation courses, students will have the knowledge required to choose from a variety of in-depth courses where they can focus on more advanced concepts and techniques based on their interest and career goals. Additionally, students will develop the following transferable skills:

- Problem-solving skills: Chemistry majors should be competent problem-solvers. They should be able to identify the essential parts of a problem and formulate a strategy for solving the problem. They should be able to estimate the solution to a problem, apply appropriate techniques to arrive at a solution, test the correctness of their solution, interpret their result, and connect it to related areas of chemistry.
- Laboratory skills: Chemistry majors should be competent experimentalists. They should be able to design and set up an experiment, collect and analyze data, identify sources of error, interpret their result, and connect it to related areas of chemistry.
- Presentation skills: Chemistry majors should be able to express (orally and in writing) their understanding of core chemical principles, the results of experiments, the analysis of problems, and their conclusions.
- Computer skills: Chemistry majors should be competent users of basic software, such as word processing, spreadsheet, and graphing programs. Strong presentation and organizing skills are complemented with computer knowledge in graphing and spreadsheets.

Admission Requirements

List admission requirements specific to the proposed program.

Students are eligible for admission to the Biochemistry (BS) program upon completion of the requirements for the Chemical Technician (AAS) degree, which includes the introductory Principles of Chemistry series, CHEM 1210/1220, and two of the five foundation courses.

Curriculum and Degree Map

Use the tables in Appendix A to provide a list of courses and Appendix B to provide a program Degree Map, also referred to as a graduation plan.

Section V: Institution, Faculty, and Staff Support

Institutional Readiness

How do existing administrative structures support the proposed program? Identify new organizational structures that may be needed to deliver the program. Will the proposed program impact the delivery of undergraduate and/or lower-division education? If yes, how?

The Biochemistry program will be housed in the Department of Chemistry. The appropriate administrative structures are in

place, along with qualified faculty and staff. Weber State University's new Tracy Hall Science Center (THSC) is a modern, four-story building with 157,000 square feet of space. THSC houses modern labs for chemistry, botany, zoology, microbiology, biology, physics, geology, and math. In addition to larger and more modern science labs, new equipment and resources will benefit students. Adding a biochemistry major at the same time that students get a new state-of-the-art building benefits and supports students in terms of space and equipment, while offering an exciting new opportunity at Weber State University. Because this is replacing an existing program, the WSU Department of Chemistry is prepared to implement the biochemistry major immediately without additional resources, faculty, or staff. Resources, faculty, and staff needs may need to be reevaluated if the number of majors increases beyond the doubling of number of majors seen by departments with similar programs.

Faculty

Describe faculty development activities that will support this program. Will existing faculty/instructions, including teaching/graduate assistants, be sufficient to instruct the program or will additional faculty be recruited? If needed, provide plans and resources to secure qualified faculty. Use Appendix C to provide detail on faculty profiles and new hires.

The WSU Department of Chemistry has been anticipating and preparing for a biochemistry major for years. The department has 11 tenured and tenure-track faculty members. Three of these faculty members (Edward Walker, Todd Johnson, and Tracy Covey) have formal biochemistry-related degrees and training. These faculty members will act as instructors for the biochemistry-related courses proposed for the major, including Biochemistry I, Biochemistry II, Medicinal Chemistry, associated laboratories, and independent biochemistry research. Dr. Covey was hired in 2014 to bring to the department specific expertise in biochemistry and medicinal chemistry. The remaining departmental faculty support the biochemistry major by teaching required chemistry courses such as General, Organic, Inorganic, Analytical, and Physical Chemistry. The chemistry department has the support of and is working closely with WSU departments of Microbiology, Zoology, and Botany which will teach the required and elective biology courses for the biochemistry major.

Staff

Describe the staff development activities that will support this program. Will existing staff such as administrative, secretarial/clerical, laboratory aides, advisors, be sufficient to support the program or will additional staff need to be hired? Provide plans and resources to secure qualified staff, as needed.

The Department of Chemistry has two full-time staff members along with multiple student positions. The department Administrative Specialist supports the administrative needs of the department and the Chemistry Laboratory Director manages the day-to-day function of the chemistry labs and the science store. The Laboratory Director also supervises student assistants that assist with lab setup and cleanup, as well as many other needs.

Student Advisement

Describe how students in the proposed program will be advised.

Students receive advising from three sources: (1) the College of Science advisor provides students with advising relative to general education and university graduation requirements; (2) the Chemistry Department Chair provides initial advising to all new chemistry and biochemistry majors; (3) once admitted to the program, majors are assigned a faculty advisor who is available for advising as needed and invites each student annually to review progress toward completing their major requirements.

Library and Information Resources

Describe library resources required to offer the proposed program if any. List new library resources to be acquired.

Existing library resources are sufficient to meet programmatic needs. These resources included the ACS publications, the Wiley Online Library, Science Direct College Edition, Nature, article databases, and print and online books.

Projected Enrollment and Finance

Use Appendix D to provide projected enrollment and information on related operating expenses and funding sources.

Section VI: Program Evaluation

Program Assessment

Identify program goals. Describe the system of assessment to be used to evaluate and develop the program.

At the end of their study at WSU, students in this program will have knowledge and comprehension of the core concepts of Biochemistry. These core concepts will be introduced in the General Chemistry 1210/1220 series and will be further developed in the five foundation classes in the specific areas of Organic Chemistry, Biochemistry, Analytical Chemistry, Physical Chemistry, and Inorganic Chemistry. The key learning outcomes for each course are described in the catalog. After completing the foundation courses, students will have the knowledge required to choose from a variety of in-depth courses where they can focus on more advanced concepts and techniques based on their interest and career goals. Additionally, students will have developed the following transferable skills:

- Problem-solving skills: Biochemistry majors should be competent problem-solvers. They should be able to identify the essential parts of a problem and formulate a strategy for solving the problem. They should be able to estimate the solution to a problem, apply appropriate techniques to arrive at a solution, test the correctness of their solution, interpret their result, and connect it to related areas of biochemistry.
- Laboratory skills. Biochemistry majors should be competent experimentalists. They should be able to design and set up an experiment, collect and analyze data, identify sources of error, interpret their result, and connect it to related areas of biochemistry.
- Presentation skills. Biochemistry majors should be able to express (orally and in writing) their understanding of core biochemical principles, the results of experiments, the analysis of problems, and their conclusions.
- Computer skills. Biochemistry majors should be competent users of basic software, such as word processing, spreadsheet, and graphing programs. Strong presentation and organizing skills are complemented with computer knowledge in graphing and spreadsheets.

Student Standards of Performance

List the standards, competencies, and marketable skills students will have achieved at the time of graduation. How and why were these standards and competencies chosen? Include formative and summative assessment measures to be used to determine student learning outcomes.

Student learning outcomes and standards of performance are a regular topic of conversation at the annual USHE Chemistry Major Committee meeting. Additionally, the ACS Guidelines and Evaluation Procedures for Bachelor's Degree Programs list student skills that should be developed as part of a certified chemistry program. The program student learning outcomes are based on these sources.

Student Standards of Performance - Courses and Methods of Measurement

CHEM 1210 Principles of Chemistry I

- Problem-solving skills: ACS exam - compared to the national norms
- Laboratory skills: laboratory experiments

CHEM 1220 Principles of Chemistry II

- Problem-solving skills: ACS exam - compared to the national norms
- Laboratory skills: laboratory experiments

CHEM 2310-2315 Organic Chemistry I

- Problem-solving skills: ACS exam - compared to the national norms
- Laboratory skills: laboratory experiments

CHEM 2320-2325 Organic Chemistry II

- Problem-solving skills: ACS exam - compared to the national norms
- Laboratory skills: laboratory experiments

CHEM 3000 Quantitative Analysis

- Problem-solving skills: homework assignments, exams
- Laboratory skills: laboratory experiments and notebooks
- Computer skills: laboratory data organization and analysis

CHEM 3020 Computer Applications in Chemistry

- Computer skills: data analysis using spreading software

CHEM 3050 Instrumental Analysis

- Problem-solving skills: homework assignments
- Laboratory skills: laboratory experiments and notebooks
- Computer skills: laboratory data organization and analysis

CHEM 3070 Biochemistry I

- Problem-solving skills: hour and final exam

CHEM 3075 Biochemistry Lab

- Laboratory skills: laboratory experiments

CHEM 3080 Biochemistry II

- Problem-solving skills: written exams

CHEM 3090 Biochemical Techniques

- Problem-solving skills: final exam

- Laboratory skills: laboratory experiments and notebooks

CHEM 3410 Foundations of Physical Chemistry

- Problem-solving skills: homework, quizzes, written exams
- Laboratory skills: laboratory experiments and project
- Presentation skills: written lab reports
- Computer skills: laboratory data organization and analysis

CHEM 3420 Physical Chemistry II

- Problem-solving skills: homework, quizzes, written exam, ACS exam
- Laboratory skills: laboratory experiments and project
- Presentation skills: written lab reports and oral presentation
- Computer skills: laboratory data organization and analysis; computational chemistry experiments and reports

CHEM 3610 Foundations of Inorganic Chemistry

- Problem-solving skills: exams
- Laboratory skills: laboratory experiments

CHEM 4250 Medicinal Chemistry

- Problem-solving skills: homework, written exams, project
- Presentation skills: written and oral project report

CHEM 4540 Spectrometric and Separation Methods

- Problem-solving skills: final exam
- Laboratory skills: laboratory experiments and project
- Presentation skills: written report and oral presentation
- Computer skills: laboratory data organization and analysis

CHEM 4600 Inorganic Chemistry

- Problem-solving skills: final exam
- Laboratory skills: laboratory experiments and project
- Computer skills: laboratory data organization and analysis

CHEM 4800 Research and Independent Study

- Problem-solving skills: final exam
- Laboratory skills: research project
- Presentation skills: written research paper

CHEM 4990 Senior Seminar

- Presentation skills: written report, oral presentation, poster

Appendix A: Program Curriculum

List all courses, including new courses, to be offered in the proposed program by prefix, number, title, and credit hours (or credit equivalences). Indicate new courses with an X in the appropriate columns. The total number of credit hours should reflect the number of credits required to be awarded the degree.

For variable credits, please enter the minimum value in the table for credit hours. To explain variable credit in detail as well as any additional information, use the narrative box at the end of this appendix.

Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)			
General Education Credit Hour Sub-Total			43
Required Courses			
CHEM 1210		Principles of Chemistry I	5
CHEM 1220		Principles of Chemistry II	5
CHEM 2310		Organic Chemistry I	4
CHEM 2315		Organic Chemistry I Lab	1
CHEM 2320		Organic Chemistry II	4
CHEM 2325		Organic Chemistry II Lab	1
CHEM 2990		Chemical Technician Seminar	1
CHEM 3000		Quantitative Analysis	4
CHEM 3070		Biochemistry I	3
CHEM 3075		Biochemistry I Lab	1
CHEM 3080		Biochemistry II	3
CHEM 3410		Foundations in Physical Chemistry	4
CHEM 3610		Foundations in Inorganic Chemistry	4
CHEM 4250		Medicinal Chemistry	3
MATH 1210		Calculus I	4
MATH 1220		Calculus II	4
PHYS 2210		Physics for Scientists and Engineers I	5
PHYS 2220		Physics for Scientists and Engineers II	5
MICR 4154		Microbial Genetics	5
Required Course Credit Hour Sub-Total			66
Elective Courses			
		Select 8 credit hours from the following:	8
BTNY 3153		Biology of the Plant Cell - 3	
BTNY 3204		Plant Physiology - 4	
BTNY 3303		Plant Genetics - 3	
BTNY 3583		Herbal Medicines - 3	
CHEM 3050		Instrumental Analysis - 4	
CHEM 3420		Physical Chemistry II - 4	
CHEM 4540		Spectrometric and Separation Methods - 4	
CHEM 4600		Inorganic Chemistry - 4	
CHEM 4700		Special Topics in Chemistry - 1	
CHEM 4800		Research and Independent Study in Chemistry - 1	

Course Number	NEW Course	Course Title	Credit Hours
MICR 3254		Immunology - 4	
MICR 3305		Medical Microbiology - 5	
MICR 4054		Microbial Physiology - 4	
MICR 4154		Microbial Genetics - 4	
MICR 4252		Cell Culture - 2	
PHYS 2010		College Physics I - 5	
PHYS 2020		College Physics II - 5	
ZOOL 3200		Cell Biology - 4	
ZOOL 3300		Genetics - 4	
ZOOL 4210		Advanced Human Physiology - 4	
ZOOL 4220		Endocrinology - 4	
ZOOL 4300		Molecular Genetics - 4	
		Additional elective to meet 120 minimum	3
Elective Credit Hour Sub-Total			11
Core Curriculum Credit Hour Sub-Total			120

Program Curriculum Narrative

Describe any variable credits. You may also include additional curriculum information.

The program is designed to afford students a maximum of flexibility while meeting the current program certification requirements of the American Chemical Society (ACS) for baccalaureate-level training.

The key aspects of program are: five foundation courses are required, one in each of the five main branches of chemistry (analytical, organic, biochemistry, physical chemistry, and inorganic); beyond the foundational courses, biochemistry students will be required to take Organic Chemistry II + lab, Biochemistry II, Biotechniques, Medicinal Chemistry, and Cell Biology (Zoology) or Microbial Genetics (Microbiology); elective credits may be filled by a variety of designated courses in the chemistry, microbiology, zoology, or botany.

Note: this curriculum outline and the degree map below assume a student will start in Calculus I. If they need to first take the prerequisites for that course (either MATH QL1050 and 1060 or MATH QL1080), this can replace the three-credit-hour general elective, and the total of all credit hours will be 122-124.

Degree Map

Degree maps pertain to undergraduate programs ONLY. Provide a degree map for proposed program. Degree Maps were approved by the State Board of Regents on July 17, 2014 as a degree completion measure. Degree maps or graduation plans are a suggested semester-by-semester class schedule that includes prefix, number, title, and semester hours. For more details see <http://higheredutah.org/pdf/agendas/201407/TAB%20A%202014-7-18.pdf> (Item #3).

Please cut-and-paste the degree map or manually enter the degree map in the table below.

First Year Fall	Cr. Hr.	First Year Spring	Cr. Hr.
CHEM 1210 PS Principles of Chemistry I	5	CHEM 1220 Principles of Chemistry II	5
MATH 1210 Calculus I	4	MATH 1220 Calculus II	4
PHYS 2210 PS Physics for Scientists & Engineers I	5	PHYS 2220 Physics for Scientists & Engineers II	5
*NTM 1501 TA Document Creation Comp Exam	0.5	*NTM 1503 TC Data Manipulation Comp Exam	0.5
NTM 1502 TB Content, Internet... Comp Exam	0.5	*NTM 1504 TD Information Literacy Comp Exam	0.5
Total	15	Total	15
Second Year Fall	Cr. Hr.	Second Year Spring	Cr. Hr.
CHEM 2310/2315 Organic Chemistry I/Lab	5	CHEM 2320/2325 Organic Chemistry II/Lab	5
CHEM 3000 Quantitative Analysis (Found Anal)	4	CHEM 2990 Chemical Tech Seminar	1
MICR 2054 LS Principles of Microbiology -or- **	4	CHEM 3070/3075 Biochemistry I (Foundation)	4
ENGL 1010 Introductory College Writing	3	CHEM 3410 Physical Chemistry I (Foundation)	4
		ENGL 2010 EN Intermediate College Writing	3
Total	16	Total	17
Third Year Fall	Cr. Hr.	Third Year Spring	Cr. Hr.
CHEM 3420 Physical Chemistry II	4	CHEM 3080 Biochemistry II	3
CHEM 3610 Foundations in Inorganic	4	CHEM 3090 Biochemical Techniques	1
ZOOL 3200 Cell Biology	4	MICR 4154 Genetics -or- ZOOL 3200 Cell Biology	4
General Education Social Science Elective	3	General Education American Institutions Elective	3
		General Education Humanities Elective	3
Total	15	Total	14
Fourth Year Fall	Cr. Hr.	Fourth Year Spring	Cr. Hr.
CHEM 4250 Medicinal Chemistry	3	CHEM 4900 Senior Seminar	1
CHEM 4800 Research & Independent Study	1	CHEM Upper Division Major Elective	3
CHEM Upper Division Major Elective	4	General Education Humanities/Creative Arts Elective	3
General Education Creative Arts Elective	3	General Education Social Science Elective	3
Upper Division Elective	4	Elective	3
Total	15	Total	13

Appendix C: Current and New Faculty / Staff Information

Part I. Department Faculty / Staff

Identify # of department faculty / staff (headcount) for the year preceding implementation of proposed program.

	# Tenured	# Tenure -Track	# Non -Tenure Track
Faculty: Full Time with Doctorate	9	2	1
Faculty: Part Time with Doctorate	1		4
Faculty: Full Time with Masters			
Faculty: Part Time with Masters			1
Faculty: Full Time with Baccalaureate			
Faculty: Part Time with Baccalaureate			2
Teaching / Graduate Assistants	/ / / / / / / / / /	/ / / / / / / / / /	
Staff: Full Time			2
Staff: Part Time			

Part II. Proposed Program Faculty Profiles

List current faculty within the institution -- with academic qualifications -- to be used in support of the proposed program(s).

	First Name	Last Name	Tenure (T) / Tenure Track (TT) / Other	Degree	Institution where Credential was Earned	Est. % of time faculty member will dedicate to proposed program.	If "Other," describe
Full Time Faculty							
	H. Laine	Berghout	T	Doctorate	University of Wisconsin - Madison	50%	
	Brandon	Burnett	TT	Doctorate	University of Nebraska - Lincoln	50%	
	Carol	Campbell	Other	Doctorate	Utah State University	10%	Instructor
	Tracy	Covey	TT	Doctorate	University of Utah	50%	
	Charles	Davidson	T	Doctorate	University of Utah	50%	
	Don	Davies	T	Doctorate	University of Nebraska - Lincoln	50%	
	Timothy	Herzog	T	Doctorate	California Institute of Technology	50%	
	Todd	Johnson	T	Doctorate	Utah State University	50%	
	J. Andy	Lippert	T	Doctorate	Brigham Young University	50%	
	Barry	Lloyd	T	Doctorate	University of Utah	50%	
	Michelle	Paustenbaugh	T	Doctorate	University of Utah	50%	
	Edward	Walker	T	Doctorate	Texas Tech University	50%	
	Charles	Wight	T	Doctorate	California Institute of Technology	1%	WSU Presid
Part Time Faculty							
	Brian	Albrecht	Other	Baccalaureate	Weber State University	0%	Adjunct
	Robert	Davidson	Other	Masters	Washington State University	0%	Adjunct
	Laird	Hartman	Other	Doctorate	University of Montana	0%	Adjunct
	Geoffrey	Russell	Other	Doctorate	University of Utah	0%	Adjunct
	Spencer	Seager	Other	Doctorate	University of Utah	0%	Adjunct

	First Name	Last Name	Tenure (T) / Tenure Track (TT) / Other	Degree	Institution where Credential was Earned	Est. % of time faculty member will dedicate to proposed program.	If "Other," describe
	Michael	Slabaugh	Other	Doctorate	Iowa State University	0%	Adjunct
	Mary Ann	Francis	Other	Baccalaureate	Weber State University	0%	Adjunct

Part III: New Faculty / Staff Projections for Proposed Program

Indicate the number of faculty / staff to be hired in the first three years of the program, if applicable. Include additional cost for these faculty / staff members in Appendix D.

	# Tenured	# Tenure -Track	# Non -Tenure Track	Academic or Industry Credentials Needed	Est. % of time to be dedicated to proposed program.
Faculty: Full Time with Doctorate					
Faculty: Part Time with Doctorate					
Faculty: Full Time with Masters					
Faculty: Part Time with Masters					
Faculty: Full Time with Baccalaureate					
Faculty: Part Time with Baccalaureate					
Teaching / Graduate Assistants	////	////			
Staff: Full Time					
Staff: Part Time					

Appendix D: Projected Program Participation and Finance

Part I.

Project the number of students who will be attracted to the proposed program as well as increased expenses, if any. Include new faculty & staff as described in Appendix C.

Three Year Projection: Program Participation and Department Budget						
	Year Preceding Implementation	New Program				
		Year 1	Year 2	Year 3	Year 4	Year 5
Student Data						
# of Majors in Department	145	200	250	250	250	250
# of Majors in Proposed Program(s)		50	100	100	150	150
# of Graduates from Department	14	15	25	25	25	25
# Graduates in New Program(s)		5	10	15	15	15
Department Financial Data						
	Department Budget					
	Year Preceding Implementation (Base Budget)	Year 1	Year 2	Year 3		
		Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)		
<i>Project additional expenses associated with offering new program(s). Account for New Faculty as stated in Appendix C, "Faculty Projections."</i>						
EXPENSES – nature of additional costs required for proposed program(s)						
<i>List salary benefits for additional faculty/staff each year the positions will be filled. For example, if hiring faculty in year 2, include expense in years 2 and 3. List one-time operating expenses only in the year expended.</i>						
Personnel (Faculty & Staff Salary & Benefits)	\$1,339,630					
Operating Expenses (equipment, travel, resources)	\$185,900					
Other: Overhead on lab fee account	\$11,000					
TOTAL PROGRAM EXPENSES		\$0	\$0	\$0		
TOTAL EXPENSES	\$1,536,530	\$1,536,530	\$1,536,530	\$1,536,530		
FUNDING – source of funding to cover additional costs generated by proposed program(s)						
<i>Describe internal reallocation using Narrative 1 on the following page. Describe new sources of funding using Narrative 2.</i>						
Internal Reallocation	\$1,346,530					
Appropriation						
Special Legislative Appropriation						
Grants and Contracts						
Special Fees	\$190,000					
Tuition						
Differential Tuition (requires Regents approval)						
PROPOSED PROGRAM FUNDING		\$0	\$0	\$0		
TOTAL DEPARTMENT FUNDING	\$1,536,530	\$1,536,530	\$1,536,530	\$1,536,530		
Difference						
Funding - Expense	\$0	\$0	\$0	\$0		

Part II: Expense explanation

Expense Narrative

Describe expenses associated with the proposed program.

Because this is a change to an old program and not a completely new program, Weber State University and WSU Department of Chemistry are prepared to implement the biochemistry major immediately without additional resources, faculty, or staff. Resources, faculty, and staff needs may need to be reevaluated if the number of majors increases beyond the doubling of number of majors seen by departments with similar programs.

Part III: Describe funding sources

Revenue Narrative 1

Describe what internal reallocations, if applicable, are available and any impact to existing programs or services.

N/A

Revenue Narrative 2

Describe new funding sources and plans to acquire the funds.

N/A