

September 17, 2014

MEMORANDUM

TO: State Board of Regents

FROM: David L. Buhler

SUBJECT: Dixie State University – Bachelor of Science in Chemistry

Issue

Dixie State University (DSU) requests approval to offer a Bachelor of Science (BS) in Chemistry. The institutional Board of Trustees approved the degree on April 28, 2014.

Background

DSU currently offers a minor in Chemistry and a Chemistry emphasis under the Integrated Studies bachelor's degree. High student interest in these programs, as well as the BS in Biology, has led the institution to propose the addition of a BS in Chemistry as DSU's first bachelor's degree in the physical sciences. According to the Utah Department of Workforce Services, Chemistry and related fields rank high in terms of employment outlook and high wages. According to the American Chemical Society, unemployment rates for chemistry professionals with a BS or higher are quite low at 3.5%. The DSU proposal also notes that a BS in Chemistry would support rapidly-growing industries in southern Utah.

DSU has tenure-track faculty with terminal degrees spanning the traditional sub-disciplines of Chemistry, with additional part-time faculty holding master's degrees in Chemistry or related fields. The proposal notes this cadre of faculty is adequate to provide the necessary courses to support a BS in Chemistry at its onset, with an additional faculty member in environmental chemistry or materials science to be hired in the near future. Several new upper-division courses and labs would be developed to meet the BS requirements, but would be initially offered on a rotating schedule so as not to adversely affect faculty workloads and lower-division offerings. In terms of facilities, DSU's new Snow Math and Physical Science Building is sufficient to support the proposed BS in Chemistry, and the institution would pursue external funding to purchase costly laboratory equipment.

Other USHE institutions provided considerable and substantive feedback on the DSU chemistry proposal regarding faculty, curriculum, equipment, and library resources. Adding the BS in Chemistry at DSU is important for the institution and region, and DSU was appreciative and mindful of the input from other USHE institutions.

Policy Issues

The proposed degree has been developed and reviewed in accordance with processes established by Dixie State University and the Board of Regents. The USHE Chief Academic Officers, with input from chemistry departments at their institutions, are supportive of DSU's request to offer a Bachelor of Science in Chemistry. There are no additional policy issues relative to approval of this program.

Commissioner's Recommendation

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

David L. Buhler
Commissioner of Higher Education

DLB/GVB
Attachment

**Program Description
Dixie State University
Bachelor of Science in Chemistry**

Section I: The Request

Dixie State University requests approval to offer a Bachelor of Science in Chemistry effective Fall Semester 2015. The institutional Board of Trustees approved the degree on April 28, 2014.

Section II: Program Description

Complete Program Description

Chemistry comprises the study of matter – from sub-atomic particles to bulk materials – and is sometimes called the “central science.” Recent progress in Chemistry leads to applications in such diverse fields as medicine, materials science, environmental science, fossil fuel and alternative-based power sources, energy security, forensic investigation, nanotechnology, and art conservation. The experimental and analytical aspects of Chemistry attract people who enjoy the challenges of problem solving by applying fundamental concepts and new skills to complex problems that were previously unsolved. Through rigorous coursework and laboratory experience, students will gain the knowledge and skills necessary to understand and address scientific problems that impact society, ranging from new therapeutics in medicine to “smart” plastics and electronics that respond to dynamic environments. As scientific issues continuously play a role in national and local policies, having a basic understanding of chemical principles empowers students to become informed citizens that can help maintain progress in society as new and evolving technological advances and concerns become significant.

The Bachelor of Science in Chemistry program offers courses covering many aspects and sub-disciplines of chemistry, and allows for hands-on experience in laboratory courses and student-driven research projects. Through fundamental topics covered in general chemistry through upper-division courses in more specific areas, students will become familiar with the cross-disciplinary nature of Chemistry and learn the vast fields of science that are impacted by concepts in Chemistry. The program therefore presents a cohesive and comprehensive coverage of chemistry fundamentals and how they are applied to the natural and anthropogenic world that surrounds us. The program also provides students with a firm foundation in integrated concepts associated with Physics, Mathematics, and Biology.

Purpose of Degree

Chemistry is one of the foundational science concepts – it can lead to many different fields and careers that have current and future job market demands. This field covers the more intricate details that control biological processes, alternative and conventional sources of energy, environmental impacts of agricultural processes, and the commercial applications of nanotechnology. The cross-disciplinary reach prepares students for careers in health sciences, materials science and technology, forensics, environmental science, and science education and teaching. Graduates in this field go on to pursue some of the fastest growing professional careers and post-graduate education, and become informed citizens of a society that is so dependent on the emerging opportunities and threats presented by a rapidly- developing technological culture. Offering the Bachelor of Science degree in Chemistry at Dixie State University provides a world of opportunities to students from the regional community to pursue their dreams across the scientific disciplines. With many students coming from the local area, there are currently limited opportunities for degrees in science at Dixie State, and in the life and physical sciences are limited to Biology and

Mathematics. Chemistry is the obvious gap that must be filled to offer students another science degree with such potential for career development. Additionally, with the expected population and business growth in Washington County over the next decade, the Chemistry degree will prepare students to fill job demand as technological and scientific corporations explore the area as their new home. It is critical that DSU trains students for this expected job growth, as well as developing capabilities to collaborate and network with current and future businesses, in order for Dixie to remain a significant asset to the community at large.

Institutional Readiness

Development of the degree in Chemistry will foster an environment conducive to student learning through undergraduate research opportunities and have no negative impact on traditional general-education programs at DSU. General Education courses will continue to be taught by dedicated full-time and adjunct professors. A larger pool of adjunct instructors will be brought in to teach laboratory sections, typically taught by graduate students at larger universities. New, upper-division (3000- and 4000-level courses) will be developed by faculty based on their background and expertise, and will be offered on rotating scheduled to ensure that lower-division courses are not impacted.

Strong support has been voiced for developing a Bachelor’s degree in chemistry from all levels of the DSU administration. New funding support will be needed in the position for a Lecturer/Advisor to help students succeed. This position is funded in all departments on campuses offering Bachelor degrees. Chemical laboratory and safety is overseen by a Chemical stockroom manager to ensure the safety of our students and faculty, and to coordinate with local, state and federal regulations for maintaining a chemical laboratory environment.

In terms of facilities, the new Snow Math and Physical Science Building will be adequate for several years to bring this program to fruition. It is expected that more space may be required in the future as Physical Science Department expands into areas of Engineering, Environmental Science, Geology, and Physics. More immediately there exists a need for equipment required for advanced laboratory courses and to equip the existing chemistry laboratories. Funding for equipment and supplies is being addressed by approaching both external (federal and private donors) and internal (appropriated) funding sources to support procurement. It is expected that funding will lie heavily in the external regime for this process, due to the cost of typical laboratory equipment.

Departmental Faculty

Department Faculty Category	Department Faculty Headcount – Prior to Program Implementation	Faculty Additions to Support Program	Department Faculty Headcount at Full Program Implementation
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	1		1
Full-time Non-Tenured	4	2	6
Part-time Tenured			
Part-time Non-Tenured	1		1
With Master’s Degrees			
Full-time Tenured			

Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured	5		5
With Bachelor's Degrees			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured	1		1
Other			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured	1		1
Total Headcount Faculty in the Department			
Full-time Tenured	2		2
Full-time Non-Tenured	4		5
Part-time Tenured			
Part-time Non-Tenured	7		7
Total Department Faculty FTE (As reported in the most recent A-1/S-11 Institutional Cost Study for "prior to program implementation" and using the A-1/S-11 Cost Study Definition for the projected "at full program implementation.")	5.62	2	7.62

Staff

Full-time Lecturer/Advisor – year one

Full-time Chemical Laboratory Manager – year two

Full-time Administrative Assistant – year three

Class and Laboratory Adjunct Instructors – added as needed

Teaching assistants – senior level students to assist but not teach labs.

Library and Information Resources

The American Chemical Society has a certification program for university chemistry departments awarding bachelor degrees in chemistry. This certification program is considered to have very rigorous standards for chemistry departments, one of the standards being student and faculty access to information resources.

The ACS states that,

"An approved program must provide students with the following minimum chemical information resources:

- An approved program must provide access to no fewer than 14 current journals chosen from the CPT recommended journal list (available from the CPT Web site) in either print or electronic form. At least three must come from the general content list, and at least one must come from each area of analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, physical chemistry, and chemistry education. In addition, the library should provide access to journal articles that are not readily available by a mechanism such as interlibrary loan or document delivery services. If primary student access is electronic, cost or impractical times for access should not limit it unduly.

- Students must have print or electronic access to Chemical Abstracts, including the ability to search and access full abstracts."

Dixie State University has access to over 14 CPT-recommended journals and the only information requirement barrier to achieving the ACS standard for certification is one general journal on the list. Currently the chemistry department is working on achieving that last access to complete the qualifications.

Admission Requirements

Most admission requirements for this program are established by the University and School standards. Prerequisites are set by different courses to ensure students are properly prepared for their coursework and program. In general, students will need a C or higher in all courses for graduation, and a cumulative C in both program/Science GPA and overall GPA to graduate with the degree.

Student Advisement

Consistent with University policies, an Advisor familiar with the program as well as careers in Chemistry and related disciplines will advise students about completion requirements, curriculum planning, and options to pursue post-baccalaureate opportunities. A Lecturer-Advisor will advise students as well as teach introductory level courses to help disseminate information about the program and what careers the program can support. In addition to faculty advising, our recently university-sanctioned student Chemistry Club will also become an American Chemical Society affiliated club, which will allow students access to resources to pursuing education and careers in the chemical sciences. This will also provide minimal funds to invite external speakers to talk about careers and aspects of the chemical profession.

Justification for Graduation Standards and Number of Credits

Graduation standards are: (1) Completion of a minimum of 121 semester credits with a minimum of 50 upper-division credits; (2) Overall grade point average of 2.0 (C) or above with a minimum of 2.0 in Major; (3) Residency hours – minimum of 30 credit hours through course attendance at DSU, with at least 15 credits earned in last 45 credits; (4) Completion of GE and specified department requirements; (5) A minimum of 52 credit hours must be in the major with a minimum of 20 credits taken at DSU; (6) Complete all chemistry courses with a minimum grade of (C) or better; and (7) Successful completion of at least two Global/Cultural Perspective courses.

External Review and Accreditation

The department will utilize the American Chemical Society (ACS) as a template and guide, with a plan for ACS accreditation in 5-7 years. The ACS promotes excellence in chemistry education for undergraduate students through approval of baccalaureate chemistry programs. Approved programs offer their students a broad-based and rigorous chemistry education that provides them with the intellectual, experimental, and communication skills to participate effectively as scientific professionals. ACS approval publicly recognizes the excellent chemistry education opportunities provided by an institution to its students. It also provides standards for a chemistry curriculum based on broad community expectations that are useful for a department when designing its curriculum or acquiring resources. The approval process provides a mechanism for departments to evaluate their programs, identify areas of strength and opportunities for change, and leverage support from their institutions and external agencies. The primary requirements for accreditation that are currently missing are generally in the area of laboratory equipment needed for hands-on experience and training in state-of-the-art instrumentation. These are primarily physical resources rather than personnel/capabilities, with expected costs ~\$500k over 5-10 years. As mentioned previously, DSU

will pursue both external and internal support for the costs necessary to meet requirements of ACS accreditation.

Projected Program Enrollment and Graduates; Projected Departmental Faculty/Students

Data Category	Current – Prior to New Program Implementation	PROJ YR 1	PROJ YR 2	PROJ YR 3	PROJ YR 4	PROJ YR 5
Data for Proposed Program						
Number of Graduates in Proposed Program	X	5	5	10	10	20
Total # of Declared Majors in Proposed Program	X	20	25	40	50	50
Departmental Data – For All Programs Within the Department						
Total Department Faculty FTE (as reported in Faculty table above)	5.62	6.62	6.62	7.62	7.62	8.62
Total Department Student FTE (Based on Fall Third Week)	158.7	165	173	180	189	197
Student FTE per Faculty FTE (ratio of Total Department Faculty FTE and Total Department Student FTE above)	28.24	24.9	26.1	23.6	24.8	22.9
Program accreditation-required ratio of Student FTE/Faculty FTE, if applicable: (Provide ratio here:_____)	NA	NA	NA	NA	NA	NA

Expansion of Existing Program

The Department currently offers a Minor in Chemistry, which tends to be associated with the Bachelor of Science in Biology. During the first year of the Minor being offered, 25 students signed up and expected to graduate this May 2014. At Dixie State, the number of Biology majors are expected to more than double in the next 5 years, and expect the minor in Chemistry and the new major in Chemistry to perform similarly as more students have an interest in pursuing science degrees.

Section III: Need

Program Need

Chemistry is one of the fundamental scientific disciplines that can be applied to several areas of the STEM fields, and therefore can prepare students for many different career fields, from biochemical engineers to analytical laboratory technicians to the medical sciences. Offering the Bachelor of Science degree in Chemistry at Dixie State University provides a world of opportunities to students from the regional community to pursue their dreams across the scientific disciplines. With many students coming from the local area, there are currently limited opportunities for degrees in science at Dixie State, and in the life and physical sciences are limited to Biology and Mathematics. Chemistry is the obvious gap that must be filled to offer students another science degree with such potential for career development.

Labor Market Demand

Chemistry uses fundamental scientific rules and methods to solve complex problems – this is a key skill for many fields, and much of that is learned through laboratory and classroom experiences in chemistry. According to the Utah Department Workforce Services, Chemistry and related fields (Biochemistry, Lab Technicians, etc.) rank statewide as a 5-star rating for having the strongest employment outlook and highest wages. This area has shown ~3% growth over the last several years (with >5% in Biochemistry). It is predicted that there are ~130 new jobs per year in Chemistry across Utah, and Biochemistry and related fields expects over 6,000 new jobs per year nationwide. In the local community of Washington County, Professional Scientific and Technical Services make up approximately 5% of the Private Sector. Additionally, employment in Washington County is up ~30% from 2011. According to the American Chemical Society, the leading professional organization for chemistry in the nation, chemistry professionals with BS or higher degree reported only 3.5% unemployment (compared to >5% in Washington County, and higher nationally). Full time employment in fields associated with Chemistry is at the highest level in 5 years. Unemployment rates tend to be higher for people with B.S. degrees, so one major advantage of providing students with a Chemistry Major is to prepare them for graduate and health professional school to obtain advanced degrees.

Student Demand

There is significant student demand for a Bachelor of Science degree in Chemistry. This is evidenced by nearly a dozen students of the class that graduated spring 2014 expressing that they would have preferred a Chemistry degree to related options (e.g., Biology degree, Integrated Studies with Chemistry Emphasis). Several students each year decide to transfer to other state institutions to complete their Chemistry degrees, rather than remain at DSU. Additionally, over 25 students have applied to graduate with a Chemistry Minor this Spring 2014, which is the first semester that this minor degree is available. Student demand is also proven by the newly formed Chemistry Club, which is a club initiated and managed by students with aims to talk about degrees, careers and opportunities in Chemistry. Also, student interest in research opportunities in chemistry has increased dramatically in the last two years, with 15-20 students involved in chemistry undergraduate research projects as compared to the average 1-2 students performing research before 2012.

Similar Programs

This degree in Chemistry will allow students to pursue a career in the sciences while attending a local open access institution. While this program will offer the same general coursework and nascent research opportunities, the unique location of DSU will allow students to eventually undergo a rigorous course in chemistry while applying knowledge to the vast scientific concerns and interests of the Colorado Plateau and the greater Washington County community. With the role that chemistry plays in ecology, environment, fossil fuels and alternative energies, and water resources and conservation, students at DSU will be able to leverage their surrounding setting to amplify their chemistry education and application. Chemistry is so central to many disciplines and careers in the sciences, government, academia, industry, and progress of the technological age, that they will play a significant role in rapidly growing Washington County, Colorado Plateau, Mojave Desert, and Arizona Strip communities and ecosystems. In addition to the potential utility of a chemistry degree in this region, hosting this program at DSU will attract students both from the immediate community that are committed to managing or conserving their local environment, to students nationwide that are keenly interested in the unique natural resources available only in this region. Other nearby and similar programs in the USHE and Intermountain Region are listed below.

Southern Utah University – Bachelor of Science in Chemistry, with emphases in Professional Chemistry, Health Care, Forensics, Teacher Education
University of Utah – Bachelor of Science in Chemistry, with emphasis in Professional Chemistry; Bachelor of Art in Chemistry, Education
Utah State University – Bachelor of Science in Chemistry, with emphases in Professional Chemistry, Biochemistry, Environmental Chemistry, and Life Science; Bachelor of Arts in Chemistry, Education
Utah Valley University – Bachelor of Science in Chemistry with emphases in Professional Chemistry, Biochemistry, and Forensic Chemistry
Weber State University – Bachelor of Science in Chemistry
Northern Arizona University – Bachelor of Science in Chemistry, Bachelor of Science in Education; Master of Science in Chemistry--Emphasis in Carcinogenesis and Cancer Chemotherapy; Master of Science in Chemistry--Emphasis in Bioorganic and Biomedical Chemistry

Collaboration with and Impact on Other USHE Institutions

DSU's chemistry faculty discussed interest in pursuing a Bachelor of Science in Chemistry at the recent USHE Majors Meeting in September 2013. The news was well received by the attending members and in fact encouraged by departments at the other USHE institutions. DSU chemistry faculty have also discussed this plan with the Chemistry Department at the University of Utah, which receives about 5-10 students each year from DSU who transfer there specifically to pursue a Chemistry Major. They (Dr. Tom Richmond) expect our degree to have only minimal impact on the overall numbers in their undergraduate program. Otherwise, there is little impact on other institutions as most of the students at DSU are from the immediate area or attend DSU due to the open enrollment access. Minimal impacts may be felt by departments in other regional institutions, including University of Nevada – Las Vegas, and Northern Arizona University. The chemistry program at DSU will have a unique emphasis and access to resources based upon the geographical location of campus.

Benefits

The new Bachelor of Science degree in Chemistry will provide USHE a new program to offer local and regional students access to a science degree at an open-enrollment institution, and in a location that is unique geographically from any other program across the country. Recruitment of students into the STEM (Science, Technology, Engineering and Math) fields is crucial for the growth of our economy. The United States Department of Labor, Bureau of Labor Statistics lists industries with the highest published employment for this occupation as: Scientific Research, Pharmaceutical and Medicine Manufacturing, Engineering and Academia. The average salary in Utah for chemists is \$72,480. Chemistry is critical for the continued growth of manufacturing and technology businesses in Utah. Chemistry is a core science, and is an important degree program at every University both in Utah and throughout the world. Dixie State University students and the USHE will be better served by providing the opportunities that a degree in Chemistry provides.

Consistency with Institutional Mission

Dixie State University (DSU) is committed to prepare students for careers in high-demand areas in the state and across the region through personalized teaching and educational experiences. This Bachelor program in Chemistry will provide in-depth knowledge of a crucial and foundational area of science that will prepare students for careers in fields across the rapidly growing STEM areas. As an undergraduate institution, DSU and the Department of Physical Sciences will be able to provide individualized instruction to small classes, something that is not available through the larger, post-baccalaureate USHE institutions that offer similar

Majors in Chemistry. With the rapidly growing industry sector in Utah including Washington County, this program will fit into DSU's mission of meeting the needs of the community as well as the students.

Section IV: Program and Student Assessment

Program Assessment

The student, at the end of any Chemistry Department course:

- Will be able to demonstrate knowledge of the skills required to make informed personal and social decisions about the issues that they will face locally as well as globally.
- Will be able to demonstrate knowledge of basic fundamental laws, concepts, and theories in the physical sciences and be able to apply them to everyday life.
- Will understand the process of science — how scientific knowledge is generated and validated — so that they can make independent, empirical inquiries about the natural world.
- Will be able to demonstrate knowledge of the process of science by being able to interpret data in the form of tables, graphs, and charts and then communicate those findings in oral and or written form.
- In department, students will be assessed every semester both qualitatively and quantitatively to evaluate student achievement and if they are meeting departmental student academic outcomes. Qualitative assessment will be based on randomized evaluation of laboratory reports by at least two faculty members to ensure triangulation validity. This assessment will be used to evaluate the process of science and how the student is applying laws and concepts. Quantitative analysis will be done using ACS standardized exams in the classroom setting and comparing DSU student averages to national averages. ACS standardized exams are available for all levels of chemistry coursework and will allow for understanding students' knowledge level in chemistry.

Expected Standards of Performance

In department, students will be assessed every semester both qualitatively and quantitatively to evaluate student achievement and if they are meeting departmental student academic outcomes. Qualitative assessment will be based on randomized evaluation of laboratory reports by at least two faculty members to ensure triangulation validity. This assessment will be used to evaluate the process of science and how the student is applying laws and concepts. Quantitative analysis will be done using ACS standardized exams in the classroom setting and comparing DSU student averages to national averages. ACS standardized exams are available for all levels of chemistry coursework and will allow for understanding students' knowledge level in chemistry.

An ACS certified chemistry degree signifies that a student has completed an integrated, rigorous program that includes introductory and foundational course work in chemistry and in-depth course work in chemistry or chemistry-related fields. The certified degree also emphasizes laboratory experience and the development of professional skills needed to be an effective chemist. Certification gives a student an identity as a chemist and helps in the transition from undergraduate studies to professional studies or employment.

Section V: Finance

Department Budget

5-Year Budget Projection							
Departmental Data	Current Departmental Budget - Prior to New Program Implementation	Departmental Budget					
		Year 1		Year 2		Year 3	
		Addition to Budget	Total Budget	Addition to Budget	Total Budget	Addition to Budget	Total Budget
Personnel Expense							
Salaries and Wages	\$803,218	\$45,000	\$848,218	\$40,000	\$888,218	\$90,000	\$978,218
Benefits	\$245,087	\$23,000	\$268,087	\$22,000	\$290,087	\$45,000	\$335,087
Total Personnel Expense	\$1,048,305	\$68,000	\$1,116,305	\$62,000	\$1,178,305	\$135,000	\$1,313,305
Non-Personnel Expense							
Travel	\$25,752	\$1,500	\$27,252	\$1,500	\$28,752	\$1,500	\$30,252
Capital	\$10,810	\$50,000	\$60,810	\$0	\$60,810	\$0	\$60,810
Library	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Current Expense	\$63,151	\$5,000	\$68,151	\$5,000	\$73,151	\$5,000	\$78,151
Total Non-personnel Expense	\$99,714	\$56,500	\$156,214	\$6,500	\$162,714	\$6,500	\$169,214
Total Expense (Personnel + Current)	\$1,148,019	\$124,500	\$1,272,519	\$68,500	\$1,341,019	\$56,500	\$1,482,519
Departmental Funding							
Appropriated Fund	\$1,001,638	\$97,000	\$1,098,638	\$66,000	\$1,164,638	\$54,000	\$1,218,638
Other:							
Special Legislative Appropriation	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Grants and Contracts	\$0	\$25,000	\$25,000	\$0	\$25,000	\$0	\$25,000
Special Fees/Differential Tuition	\$146,380	\$2,500	\$148,880	\$2,500	\$151,380	\$2,500	\$153,880
Total Revenue	\$1,148,019	\$124,500	\$1,272,519	\$68,500	\$1,341,019	\$56,500	\$1,397,519
Difference							
Revenue - Expense	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Departmental Instructional	\$94	\$4	\$98	\$2	\$100	\$0	\$100

Cost/Student Credit Hour* (as reported in institutional Cost Study for "current" and using the same Cost Study Definition for "projected")							
* Projected Instructional Cost/Student Credit Hour data contained in this chart are to be used in the Third-Year Follow-Up Report and Cyclical Reviews required by R411.							

Additions to budgets include:

Year 1 – Chemistry Lecturer/Advisor.

Year 2 – Laboratory Manager

Year 3 – Administrative Assistant; Material Science Chemistry professor

Funding Sources

The majority of courses for the Chemistry program are already being taught by existing faculty members, with only a couple of upper division courses left to add. Faculty will teach these courses on rotation, and this will have only a small effect on workload. Laboratory sections that are typically part of a faculty workload will be taught by adjuncts in order to free up full-time faculty to develop and teach upper division courses. We anticipate hiring a material science chemist in the third year. It is anticipated that growth of DSU and the chemistry program will be adequate to fund the additional position.

Reallocation

Not applicable.

Impact on Existing Budgets

Whereas the majority of courses in the program are currently offered by current DSU faculty, there will be no negative impacts on existing budgets.

Section VI: Program Curriculum

All Program Courses (with New Courses in Bold)

Course Prefix and Number	Title	Credit Hours
General Education Required Courses		
CIS 1200 or CIS 1201	Computer Literacy	0-3
ENGL 1010 or ENGL 1010A or ENGL 1010D	English	3
ENGL 2010 or ENGL 2010A	English	3
LIB 1000 or LIB 1010	Information Literacy	0-1
	Mathematics	3-5
	American Institutions	3-6

Course Prefix and Number	Title	Credit Hours
	Life Sciences	3-4
	Physical Sciences	3-4
	Laboratory Science	1
	Fine Arts	3
	Literature / Humanities	3
	Social & Behavioral Sciences	3
	Exploration	3-5
	Global & Cultural Perspectives	0-3
	Global & Cultural Perspectives	0-3
	Sub-Total	22
Chemistry Program Requirements		
MATH 1210	Calculus I	5
MATH 1220	Calculus II	5
BIOL 1610/15	Principles of Biology I/Lab	5
BIOL 1620/25	Principles of Biology II/Lab	5
PHYS 2210/15	College Physics I/Lab	5
PHYS 2220/25	College Physics II/Lab	5
	Sub-Total	30
Chemistry Core Requirements		
CHEM 1210/15	General Chemistry I/Lab	5
CHEM 1220/25	General Chemistry II/Lab	5
CHEM 2310/15	Organic Chemistry I/Lab	5
CHEM 2320/25	Organic Chemistry II/Lab	5
CHEM 3060/65	Physical Chemistry I/Lab	5
CHEM 3000/10	Analytical Chemistry I/Lab	5
CHEM 3300	Instrumental Lab	4
CHEM 4910	Senior Seminar	1
	Sub-Total	35
Chemistry Elective Courses (core) (must choose at least 3 of the following)		
CHEM 3510/20	Biochemistry I/Lab	4
CHEM 3510/20	Biochemistry II/Lab	4
CHEM 3100	Advanced Inorganic Chemistry	4
CHEM 3070	Physical Chemistry II	5
	Sub-Total	12
Chemistry Elective Courses		
CHEM 4310	Advanced Organic Chemistry I	3
CHEM 4320	Advanced Organic Chemistry II	3
CHEM 4510	Chemistry of Materials	3
CHEM 4700	Special Topics in Chemistry	3-6
CHEM 4800	Independent Research	1-4

Course Prefix and Number	Title	Credit Hours
BIOL 3030	Molecular Genetics	4
BIOL 3150/55	Biostatistics and Lab	3
BIOL 4300/05	Molecular Biology/Lab	2
	Sub-Total	22
Total Number of Credits		121

Program Schedule

Year 1 – Fall semester - 14 hours	Year 1 – Spring semester - 16 hours
CHEM 1210/15 – General Chemistry I/Lab (5) MATH 1210 – Calculus I (5) ENGLISH 1010 – Intro. to Writing(3) LIB 1000 – Information Literacy (1)	CHEM 1220/25 - General Chemistry II/Lab (5) MATH 1220 – Calculus II (5) ENGLISH 2100 – Technical Writing (3) CIS 1200 – Computer Literacy (3)
Year 2 – Fall semester - 15 hours	Year 2 – Spring semester - 15 hours
CHEM 2310/15 – Organic Chemistry I/Lab (5) BIOL 1610/15 – Principles of Biology I/Lab (5) PHYS 2210/15- College Physics I/Lab (5)	CHEM 2320/25 – Organic Chemistry II/Lab (5) BIOL 1620/25 – Principles of Biology II/Lab (5) PHYS 2220/25 – College Physics II/Lab (5)
Year 3 – Fall semester - 16 hours	Year 3 – Spring semester - 15 hours
CHEM 3060/65 – Physical Chemistry I/Lab (5) CHEM 3000/10 – Analytical I/Lab (5) ANTH 1000 – Introduction to Anthropology (3) ARTH 2710 – Art History I (3)	CHEM 3070 – Physical Chemistry II (5) CHEM 3300 – Instrumental Lab (4) CIS computer literacy (3) General or Chemistry Elective (3)
Year 4 – Fall semester – 15 hours	Year 4 – Spring semester –15 hours
CHEM 3510/20 – Biochemistry I/Lab (4) CHEM 3110 – Adv. Inorganic (4) CHEM 4800R – Independent Research (1-3) Chemistry Elective (3) Chemistry Elective (3)	CHEM 3520/25 – Biochemistry II/Lab (4) CHEM 4800R – Independent Research (1-3) CHEM 4910 – Senior Seminar (1) Chemistry Elective (3) Chemistry Elective (3) General or Chemistry Elective (3)

Section VII: Faculty

Tenure-track full-time Chemistry Faculty (alphabetical)

Gabriela Chilom – Ph.D. in Chemistry (South Dakota State University), 2004; M.S. in Physical Chemistry (Polytechnic Institute, Romania), 1898, B.S. in Chemistry (Polytechnic Institute), 1988

Rico Del Sesto – Ph.D. in Organic Chemistry (University of Utah), 2002; B.A. in Chemistry (Colby College, Waterville, ME), 1997

David Feller – Ph.D. in Computational Biochemistry (Brigham Young University), 1989; B.S. in Chemistry and German (Southern Utah University), 1984; A.S. (Dixie College), 1982

Martina Gaspari – Ph.D. in Cell and Molecular Biology (Karolinska Institute, Stockholm), 2006; M.Sc. in Biological Sciences (University of Padua, Italy), 1999

Katherine N. Leigh – Ph.D. in Inorganic Chemistry (University of Memphis), 2014; M.S. in Inorganic Chemistry (University of Memphis), 2013; B.S. in Chemistry and Biology (Southern Utah University), 2006

Wendy Schatzberg – Ph.D. in Chemical Education (University of Northern Colorado), 2009; M.S. in Analytical/Physical Chemistry (Colorado State University), 2007; B.S. in Chemistry (Western Washington University)

Adjunct and Part-time Faculty

Kenneth Pyles – M.S. Chemistry

Sarah M. Black – M.S. Chemistry

David Burr – M.S. Chemistry

Dale Felix – Ph.D. Chemistry

Paul Shirley – M.S. Chemistry

Brian Lefler – M.S. Chemistry