

### NEW PROGRAM PROPOSAL FORM

Name of Institution:

University of South Carolina Aiken

Name of Program (include degree designation and all concentrations, options, or tracks):

Bachelor of Arts (B.A.) in Chemistry

Program Designation:

- |   |  |
|---|--|
| <input type="checkbox"/> Associate's Degree   | <input type="checkbox"/> Master's Degree   |
| <input checked="" type="checkbox"/> Bachelor's Degree: 4 Year   | <input type="checkbox"/> Specialist  |
| <input type="checkbox"/> Bachelor's Degree: 5 Year  | <input type="checkbox"/> Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA) |
| <input type="checkbox"/> Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.) |  |

Consider the program for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes  
 No

Proposed Date of Implementation: Fall 2019

CIP Code: 400501

Delivery Site(s): University of South Carolina Aiken (USC Aiken)

Delivery Mode:

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Traditional/face-to-face<br>*select if less than 25% online | <input type="checkbox"/> Distance Education                             |
|   | <input type="checkbox"/> 100% online                                    |
|   | <input type="checkbox"/> Blended/hybrid (50% or more online)            |
|   | <input type="checkbox"/> Blended/hybrid (25-49% online)                 |
|   | <input type="checkbox"/> Other distance education (explain if selected) |

Program Contact Information (name, title, telephone number, and email address):

**Dr. Chad Leverette, Professor and Chair, Dept. of Chemistry and Physics**  
**University of South Carolina Aiken**  
**803-641-3291**  
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Institutional Approvals and Dates of Approval (include department through Provost/Chief Academic Officer, President, and Board of Trustees approval):

**Department 04/18/2018**  
**College Council 08/13/2018**  
**University Planning Committee 09/21/2018**  
**Courses and Curriculum Committee 10/04/2018**  
**Faculty Assembly 12/05/2018**  
**Chancellor 12/05/2018**

### **Background Information**

State the nature and purpose of the proposed program, including target audience, centrality to institutional mission, and relation to the strategic plan.

This B.A. degree is an attractive pre-professional degree for students seeking to enter medical school, pharmacy school, or some other professional school (law, veterinary medicine, etc.). There are three major advantages to offering this degree: 1) it can be completed in three years, if a student entering USC Aiken has a solid math background (entering ready for pre-calculus or calculus) and plans to utilize summer school for completion of some of the general education courses, 2) it allows students to double major in chemistry and another discipline more easily, and 3) is a more flexible degree option that will increase the accessibility of a chemistry degree for students who want to change majors. This degree augments our nationally certified B.S. degree in chemistry.

This degree supports the direction of our university's current strategic plan by meeting the following requirements: 1) it is a creative approach to a degree offering, 2) the flexibility of the program may allow for enhanced student retention and progression towards a degree by allowing students to easily switch majors and pursue this chemistry degree without extending the time it takes to obtain the degree, 3) it may help expand enrollment, and 4) it will improve our graduation rate. Currently, students pursuing pharmacy degrees transfer after three years (typically) to enter into the Pharm.D. program at another institution. This counts negatively against our university's graduation rate even though these students are getting accepted and are being successful in pharmacy school. This degree can be completed in 3 years and will allow students to obtain a degree before moving on into pharmacy school.

### **Assessment of Need**

Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable.

The CHE Occupational Outlook study (Von Nessen, 2016) discusses the "value and need for additional graduates in the STEM fields". In particular, this report mentions the goal of the South Carolina Science and Technology Task Force to increase the number of students in STEM fields, which includes BA/BS degrees, by 25 percent by 2025. Within the last three years, in an attempt to help fill this demand and increase the marketability of its graduates, the Department of Chemistry and Physics at USC Aiken has sought and obtained national certification for its B.S. degree from the American Chemical Society and has developed two additional nationally certified degree options (B.S. Chemistry with a Concentration in Biochemistry, B.S. Chemistry with a Concentration in Engineering). These degree options are rigorous and most appropriate for students pursuing employment in the chemical industry or graduate school in chemistry. Unfortunately, these options have a full, rigid curriculum with research expectations that make the program difficult for students to switch majors or double major in chemistry without increasing time in college. This flexible B.A. degree will overcome this limitation and help increase the number of STEM graduates. The B.A. degree is also appropriate and flexible for admission into professional schools in the areas of medicine, dentistry, pharmacy, veterinary medicine, and law. In Proviso 117.127 "South Carolina's Workforce Study" (State Board for Technical and Comprehensive Education, 2016) a 25% increase in jobs in the "Health Care" Cluster from 2015 to 2025 is expected. Most of these jobs in this sector require an undergraduate degree, such as this B.A. degree, before pursuing an advanced degree in a health care field.

**Transfer and Articulation**

Identify any special articulation agreements for the proposed program. Provide the articulation agreement or Memorandum of Agreement/Understanding.

None

**Employment Opportunities**

Occupation	State		National		Data Type and Source
	Expected Number of Jobs	Employment Projection	Expected Number of Jobs	Employment Projection	
Physician-general	3670 by 2026	12% growth (130 job/yr)	414,700 by 2026	11% growth (14,300/yr)	O*Net
Dentist	2180 by 2026	21% growth (90/yr)	158,500 by 2026	19% growth (6400/yr)	O*Net
Veterinarian	1200 by 2026	18% growth (60/yr)	94,600 by 2026	19% growth (4500/yr)	O*Net
Pharmacist	5230 by 2026	8% growth (250/yr)	329,900 by 2026	6% growth (15,300/yr)	O*Net
Chemist	1220 by 2026	7% growth (110/yr)	94,000 by 2026	7% growth (8600/yr)	O*Net
Lawyer	8870 by 2026	9% growth (420/yr)	857,500 by 2026	8% growth (40,700/yr)	O*Net

**Supporting Evidence of Anticipated Employment Opportunities**

Provide supporting evidence of anticipated employment opportunities for graduates.

A recent market study completed by the USC Aiken School of Business Administration titled “USCA New Academic Program- BA in Chemistry” concluded that the B.A. degree is not a preferred degree for students seeking graduate school in chemistry or a position in chemical industry. Although 33% of respondents to a survey administered to over 362 companies in this study indicated that they do not differentiate between graduates with a B.A. and B.S. degree, an overwhelming 67% did say they preferred students with a B.S. degree for chemical industry jobs. Therefore, listing specific employment opportunities would not be the most appropriate evaluation of anticipated opportunities for graduates with this B.A. degree. It should be noted, however, that on March 12, 2018, a search on Indeed.com, using key word “chemist”, yielded 114 chemistry related jobs in industry in South Carolina and 204 related jobs in Georgia.

This B.A. degree will be advertised as a pre-professional degree option. To this end, to understand if this degree option was acceptable for admittance into professional school, we developed a survey and contacted professional schools in the areas of medicine and pharmacy and asked the following questions:

- 1) Do you accept high performing students with a B.A. degree in chemistry?
- 2) How many students accepted into your programs have a B.A. degree?
- 3) Is an applicant with a B.A. degree as competitive as an applicant with a B.S. degree?
- 4) Do you differentiate between students with a B.A. degree from B.S. degree applicants?

We surveyed the following institutions:  
 Medical University of South Carolina (MUSC)  
 USC School of Medicine  
 South Carolina College of Pharmacy  
 Presbyterian College, College of Pharmacy  
 South University, College of Pharmacy  
 Augusta University Medical School

**Conclusions:**

- A) These schools do accept students with either a B.S. or B.A. degree and they do not differentiate between them when considering admission. They are looking for high performing students that have taken the prerequisite undergraduate classes and that have scored well on entrance examinations (MCAT or PCAT).
- B) Students with B.A. degrees are just as competitive as those with B.S. degrees.

Admissions data from a recent fall semester entering class for both medical school and pharmacy school suggests that about 14% of students accepted had B.A. degrees. Although this implies differentiation during the selection process, the admissions staff for these institutions stated that they do not differentiate and speculated that this result may be because most schools either only have the B.S. degree option or students may think they need a B.S. degree when preparing for these professional schools.

**Description of the Program**

Projected Enrollment			
Year	Fall Headcount	Spring Headcount	Summer Headcount
2019-2020	3	3	3
2020-2021	7	7	7
2021-2022	11	11	11
2022-2023	15	15	15
2023-2024	16	16	16

Explain how the enrollment projections were calculated.

Projected enrollment based on a 0.3 4-year attrition rate.

Entry Year/Year	2019-20	2020-21	2021-22	2022-23	2023-24
2018	3	2	2	2	0
2019		5	4	4	3
2020			5	4	4
2021				5	4
2022					5
Grand Total	3	7	11	15	16
Estimated 4-Year Attrition Rate					
0.3					

Besides the general institutional admission requirements, are there any separate or additional admission requirements for the proposed program? If yes, explain.

Yes

No

### **Curriculum**

#### **New Courses**

List and provide course descriptions for new courses.

N/A \*\*All courses are currently being offered for the B.S. degree option.

Total Credit Hours Required: 122

Curriculum by Year					
Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
<b>Year 1</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
ENGL 101	3	ENGL 102	3	U.S. Political Inst.	3
CHEM 111	4	CHEM 112	4	Social/Behav. Science	3
BIOL 121	4	MATH 142	4	Humanities	3
MATH 141	4	Social/Behav. Science	3	Humanities	3
AFCI 101	1	HIST 101 or 102	3		
Total Semester Hours	16	Total Semester Hours	17	Total Semester Hours	12
<b>Year 2</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
CHEM 331	3	CHEM 332	3	Humanities	3
CHEM 331L	1	CHEM 332L	1	COMM 201 or 241	3
PHYS 201	4	PHYS 202	4	Elective	3
CHEM 321	3	CHEM 311	3	Elective	3
CHEM 321L	1	CHEM 311L	1		
Language	4	Language	4		
Total Semester Hours	16	Total Semester Hours	16	Total Semester Hours	12

Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
<b>Year 3</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
CHEM 541	3	CHEM 542	3		
CHEM 541L	1	CHEM 542L	1		
BIOL 541	4	CHEM 522	5		
Elective	3	Cognate	4		
Elective	3	Cognate	3		
Elective	3				
Total Semester Hours	17	Total Semester Hours	16	Total Semester Hours	
<b>Year 4</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
Total Semester Hours		Total Semester Hours		Total Semester Hours	
<b>Year 5</b>					
<b>Fall</b>		<b>Spring</b>		<b>Summer</b>	
Total Semester Hours		Total Semester Hours		Total Semester Hours	

**Similar Programs in South Carolina offered by Public and Independent Institutions**

Identify the similar programs offered and describe the similarities and differences for each program.

Program Name and Designation	Total Credit Hours	Institution	Similarities	Differences
Chemistry - BA	123	Clemson University	The two programs have similar core classes.	Clemson does not require physical chemistry labs, biochemistry, or instrumentation analysis. All of these would be required for the B.A. in chemistry at USC Aiken
Chemistry - BA	At least 122	College of Charleston	The two programs have similar core classes.	The CoC curriculum requires less hours than the USC Aiken degree. In particular, students can choose one of the following to take: inorganic chem, instrumental analysis, and biochem. All three are required at USCA.
Chemistry - BA	118-120	The Citadel	The two programs have similar core classes.	The B.A. at Citadel has a research component, but a good bit less coursework required. Students only have to choose one of the following: analytical chemistry, physical chemistry, inorganic chemistry, or biochemistry. All of these are required for the B.A. at USC Aiken.
Chemistry - BA	103	Converse College	The two programs have similar core classes.	Converse only requires physical chemistry I and has a research component. USC Aiken requires physical chemistry I and II, no research component, and courses in inorganic and biochemistry along with instrumental analysis.



Chemistry - BA	>90	Columbia College	The two programs have similar core classes.	Columbia College only requires 33 credit hours. USC Aiken requires 41 hours. In addition, Columbia College does not require coursework in inorganic chemistry, biochemistry, or instrumental analysis.
Chemistry - BA	120	Southern Wesleyan University	The two programs have similar core classes.	SWU requires only requires one calculus course and does not require physical chemistry I or II, unlike USC Aiken.
Chemistry - BA	120	Wofford College	The two programs have similar core classes.	Wofford is similar to USC Aiken. They do offer a biotechnology course offering that USC Aiken does not have. Other than this, the two programs require similar coursework. USC Aiken does not allow students to choose if they take the second PChem course unlike Wofford. USC Aiken requires a fundamental course in each of the five subdisciplines. Wofford allows Inorganic Chemistry with lab to be an option. Wofford only requires 33 hours. USC Aiken requires 41.
Chemistry - BA	120-125	USC Upstate	The two programs have similar core classes.	USC Upstate allows students to choose 7 additional credit hours from a list of major courses. USC Upstate requires 2 semesters of organic chemistry and 1 semester or analytical and 1 semester of physical. Students can choose a research course from their 7 addn credit hours as well as the second course in analytical or physical. In summary, students will not get a fundamental course in each of

				the five subdisciplines of chemistry compared to USC Aiken.
Chemistry - BS	127	Erskine College	The two programs have similar core classes.	Erskine only has the B.S. degree, but this degree is essentially the same as the proposed B.A. degree at USC Aiken.
Chemistry - BA	At least 120	Coker College	The two programs have similar core classes.	Coker only offers one degree in Chemistry, but offers a pre-pharmacy concentration to help those interested in going to pharmacy school. This degree is similar to the proposed B.A. at USC Aiken, but the B.A. at USC Aiken allows flexibility for students going into any type of professional school. At Coker, they require a foundational course in each of the five subdisciplines of chemistry, but their degree has a research component. Their degree is only 36 hrs compared to 41 for the proposed B.A.

**Faculty**

Rank and Full- or Part-time	Courses Taught for the Program	Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major	Other Qualifications and Relevant Professional Experience (e.g., licensures, certifications, years in industry, etc.)
Professor of Physical Chemistry (Full-Time)	CHEM 111 (4) – General Chemistry I – Fall  CHEM 112 (4) – General Chemistry II – Spring  CHEM 541/541L (4) – Physical Chemistry I – Fall  CHEM 542/542L (4) – Physical Chemistry II - Spring	B.S. Wichita State – 1981  Ph.D. Physical Chemistry – UC Santa Barbara - 1987	
Professor of Analytical Chemistry (Full-Time)	CHEM 321/321L (4) – Quantitative Analysis – Fall  CHEM 522 (5) – Instrumental Analysis – Spring	B.S. Erskine College – 1996  Ph.D. Analytical Chemistry – Univ. of Georgia - 2000	3.5 years in industry (Cargill, Incorporated – Global Research and Development)
Associate Professor of Inorganic Chemistry (Full-Time)	CHEM 111 (4) – General Chemistry I – Fall  CHEM 112 (4) – General Chemistry II – Spring  CHEM 311/311L (4) – Intro. to Inorganic Chemistry – Fall  CHEM 511 (4) – Advanced Inorganic Chemistry - Fall	B.S. SUNY-Stony Brook – 2002  Ph.D. Inorganic Chemistry – Boston University - 2008	
Associate Professor of Biochemistry (Full-Time)	BIOL 541 (4) – Principles of Biochemistry - Fall	B.S. University of Arizona – Tucson – 1999  Ph.D. Biochemistry – University of Missouri – Columbia – 2005	

Assistant Professor of Biochemistry (Full-Time)	CHEM 112 (4) – General Chemistry II – Fall	B.S. University of Washington – 1996  Ph.D. Biochemistry – Washington State University - 2009	
Assistant Professor of Organic Chemistry (Full-Time)	CHEM 331/331L (4) – Organic Chemistry I – Fall  CHEM 332/332L (4) – Organic Chemistry II - Spring	B.S. Kennesaw State University – 2004  Ph.D. Materials Science – University of Georgia - 2010	

Total FTE needed to support the proposed program:

Faculty:

Staff:

Administration:

### **Faculty, Staff, and Administrative Personnel**

Discuss the Faculty, Staff, and Administrative Personnel needs of the program.

No changes are expected to current faculty load or number of courses offered each semester. The courses required for this degree are already being offered each semester.

### **Resources**

#### **Library and Learning Resources**

Explain how current library/learning collections, databases, resources, and services specific to the discipline, including those provided by PASCAL, can support the proposed program. Identify additional library resources needed.

Through the Gregg-Graniteville Library, the B.A. students in Chemistry will have access to: over 130,000 print volumes, over 4,000 media materials, 232 electronic databases (most with full text), over 100,000 e-journals, and approximately 350,000 e-books as well as more than 14,000 print government documents and electronic access to many additional titles. Important to the sciences, the library has access to online ACS publications and the search engine, Web of Science, in addition to many others in the disciplines of science and mathematics. The current monograph and journal collection is adequate to meet the needs of the proposed degree program with no additional library funds required.

#### **Student Support Services**

Explain how current academic support services will support the proposed program. Identify new services needed and provide any estimated costs associated with these services.

This program will be supported by our Center for Student Achievement like all other degrees at USC Aiken. No additional academic support services are expected for this program.

#### **Physical Resources/Facilities**

Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements.

The current laboratory and classroom space in the Sciences building at USC Aiken will be used to support this program.

**Equipment**

Identify new instructional equipment needed for the proposed program.

No additional instructional equipment is needed for this program.

**Impact on Existing Programs**

Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain.

Yes

No

This B.A. degree will provide the fourth degree option for students majoring in chemistry at USC Aiken. It could lessen the number of graduates that complete the B.S. degree, but should increase the total number of students graduating from USC Aiken with a chemistry degree. The anticipated growth expected from this degree should increase the number of students enrolled in our chemistry courses, but not levels that would add strain to these offerings.

**Financial Support**

Sources of Financing for the Program by Year												
Category	1 <sup>st</sup>		2 <sup>nd</sup>		3 <sup>rd</sup>		4 <sup>th</sup>		5 <sup>th</sup>		Grand Total	
	New	Total	New	Total	New	Total	New	Total	New	Total	New	Total
Tuition Funding												
Program-Specific Fees												
Special State Appropriation												
Reallocation of Existing Funds												
Federal, Grant, or Other Funding												
<b>Total</b>												
Estimated Costs Associated with Implementing the Program by Year												
Category	1 <sup>st</sup>		2 <sup>nd</sup>		3 <sup>rd</sup>		4 <sup>th</sup>		5 <sup>th</sup>		Grand Total	
	New	Total	New	Total	New	Total	New	Total	New	Total	New	Total
Program Administration and Faculty/Staff Salaries												
Facilities, Equipment, Supplies, and Materials												
Library Resources												
Other (specify)												
<b>Total</b>												
<b>Net Total</b> (Sources of Financing Minus Estimated Costs)												

**Note:** New costs - costs incurred solely as a result of implementing this program. Total costs - new costs; program's share of costs of existing resources used to support the program; and any other costs redirected to the program.

### Budget Justification

Provide an explanation for all costs and sources of financing identified in the Financial Support table. Include an analysis of cost-effectiveness and return on investment and address any impacts to tuition, other programs, services, facilities, and the institution overall.

### Evaluation and Assessment

#### Program Objectives

In the context of a liberal arts education, the Bachelor of Arts in Chemistry degree will provide students with:

- 1) Knowledge in the five subdisciplines of chemistry;
- 2) Experience applying chemical knowledge and skills to analyzing and solving problems;
- 3) Experience in communicating solutions to problems in chemistry.

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
Knowledge in the five subdisciplines of chemistry.	<p>SLO1: Knowledge and Comprehension</p> <p>Students will recognize and distinguish the fundamental principles of the chemical sciences including the theory and practice of the discipline. Students will recognize and distinguish the theory and practice of: a). Analytical Chemistry, b). Inorganic Chemistry, c). Organic Chemistry, d). Physical Chemistry, e). Biochemistry.</p>	<p>Administration of a Senior Exit Exam</p> <p>ACS national exam scores for CHEM 321, CHEM 332, CHEM A542, CHEM 522</p> <p>Embedded questions in final exam for CHEM 311 and BIOL 541</p> <p>Student Exit Survey</p>
Experience applying chemical knowledge and skills to analyzing and solving problems	<p>SLO2: Application</p> <p>Students will apply theory to practice by participating in eight laboratory courses that cover all five subfields of chemistry. Students will find placement into professional school.</p>	<p>Placement of graduates will be recorded each year</p> <p>Students will present an oral presentation in CHEM 522</p> <p>Evaluation of a Formal Lab Report - CHEM 542 (Writing Intensive Course)</p> <p>ACS national exam scores for CHEM 321, CHEM 332, CHEM A542, CHEM 522</p> <p>Embedded questions in final exam for CHEM 311 and BIOL 541</p> <p>Student Exit Survey</p>
Experience in communicating solutions to problems in chemistry	<p>SLO3: Communication</p> <p>Students will communicate clearly in writing through two writing intensive lab courses</p>	<p>Evaluation of the University Writing Proficiency Portfolios for graduates (WPP)</p> <p>Students will present an oral presentation in CHEM 522</p>

	that are required as well as six other lab courses that will require formal lab reports. Students will be able to give an oral presentation in the discipline.	Evaluation of a Formal Lab Report - CHEM 542 (Writing Intensive Course)
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Explain how the proposed program, including all program objectives, will be evaluated, along with plans to track employment. Describe how assessment data will be used.

The department's assessment plan and results for program objectives and student learning outcomes are currently reviewed on a three-year rotation by USC Aiken's Academic Assessment Committee. This practice will continue. In the Department of Chemistry and Physics at USC Aiken, the department has an internal Academic Assessment Committee that reviews the curriculum of the department each year and provides recommendations to the unit head. The unit head conducts a comprehensive review of the assessment data each academic year. Annual oversight of the department's assessment results is carried out by the Dean of the College of Sciences and Engineering and by the university's Executive Vice Chancellor for Academic Affairs.

Watermark is the repository for assessment reports. Relevant data and reports for this new degree program will be uploaded to and available from Watermark. Continuous improvement to both courses and program will be pursued in response to assessment findings.

Employment of graduates will be tracked through the cooperative efforts of the department, Office of Career Services, and the Alumni Office.

#### **Accreditation and Licensure/Certification**

Will the institution seek program-specific accreditation (e.g., CAEP, ABET, NASM, etc.)? If yes, describe the institution's plans to seek accreditation, including the expected timeline.

Yes

No

Will the proposed program lead to licensure or certification? If yes, identify the licensure or certification.

Yes

No

Explain how the program will prepare students for this licensure or certification.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline.

Yes

No