

# BACCALAUREATE AND MASTER'S DEGREES

NEW PROPOSAL FORMS

## LETTER OF INTENT

RECEIVED

APR 20 2009

**Institution:** Clayton State University

**M.MIDDLETON**

**Institutional Contact (President or Vice President for Academic Affairs):** Dr. Sharon E. Hoffman,  
Provost and Vice President for Academic Affairs

**Date:** March 30, 2009

**School/Division:** School of Arts and Sciences

**Department:** Natural Sciences

**Name of Proposed Program:** Bachelor of Science in Chemistry

**Degree:** Bachelor of Science

**Major:** Chemistry

**Degree Inscription:** Bachelor of Science (B.S.)

**CIP Code:** 40.0501

**Anticipated Starting date:** August 2009

**Program Classification:** Chemistry, General

---

### 1. Program Description and Objectives:

- a. Objectives of the program
- b. Needs the program will meet
- c. Brief explanation of how the program is to be delivered
- d. Prioritization within the institution's strategic plan

Clayton State University (CSU) proposes to establish a Bachelor of Science in Chemistry to meet the academic needs of the Southern Crescent region of metropolitan Atlanta. As the University grows in size, it must also increase the educational and career options it provides. The addition of the chemistry major will significantly enhance the University's mission to offer undergraduate programs of superior quality and to provide outstanding opportunities for students from a diverse range of ethnic, socioeconomic, and experiential backgrounds.

The Department of Natural Sciences at CSU has a well-established and growing biology major with 373 undergraduate students, and also supports 89 students in the Pre-pharmacy and 51 students in Pre-engineering Associate degree programs. Over 80% of science majors at CSU are minority or multiracial students and over 60% are women. Establishment of a chemistry program at CSU will result in an increase in well-trained chemistry graduates in this region, and will partially address the national shortage of minority chemists.

The chemistry program at Clayton State will include a core of chemistry, physics, and mathematics courses that will provide the students with skills essential for all chemistry-related careers, and will be combined with directed electives in a selected area of interest. The curriculum will include existing chemistry courses, new upper-division core and elective courses, new physics elective courses, and existing courses from the related disciplines of physics, mathematics, computer science, and biology. Appropriate technology will be incorporated at all levels of the curriculum. Students will also be required to participate in internships or independent research. Students who complete the 120 hour program of study will be prepared to join the chemical workforce or to pursue further graduate or professional education. Based on enrollment in BS in Chemistry programs at similar University System of Georgia Institutions an initial enrollment of approximately 100 majors is expected.

The proposed chemistry program was developed after careful investigation of the needs and desires of Clayton State students and the University, the capabilities of the department to support the workload added by the major, the expertise of faculty within the department, and the curricula for chemistry programs at other colleges and universities. The program is based upon the current and future ability of the Department of Natural Sciences to support such a proposal as well as a careful comparison of the courses offered at CSU to comparable institutions with a program in chemistry. The curriculum was designed following the guidelines established by the American Chemical Society. All tenured and tenure-track chemists on the faculty of the Department of Natural Sciences and the Head of the Department participated in the development process.

Although the chemistry degree will be a new program on campus, it is a major that builds on existing strengths and resources of the University. Many of the courses that comprise the program already exist as part of the Biology major or Chemistry minor, and are currently being taught on a regular rotation. Moreover, many of the proposed new courses will support other programs, such as Pre-Engineering and Mathematics.

Clayton State University's proposed Bachelor degree in chemistry addresses goals 1, 2, 3, and 5 defined by the University System of Georgia Strategic Plan.<sup>1</sup> In addition, the initiative for the proposed Bachelor degree in chemistry is based on the following theme from Clayton State University's Strategic Plan:

***Development and Enhancement of Undergraduate and Graduate Academic Programs.*** *The University continues to develop high quality undergraduate and graduate programs to meet increasing student and societal needs. This includes adding traditional and innovative programs at undergraduate and graduate levels, improving existing programs, and continuing to be a leader in the use of technology to enhance teaching and learning.*

---

<sup>1</sup> The University System of Georgia Strategic Plan ([http://www.usg.edu/strategicplan/docs/strategic\\_plan2008.pdf](http://www.usg.edu/strategicplan/docs/strategic_plan2008.pdf))

## **2. Description of the program's fit with the institutional mission and nationally accepted trends in the discipline.**

This proposal will not require a change in institutional mission since it addresses a significant educational need of the service area of Clayton State University. Nor does the new major require a new organizational unit because it will be housed in the Department of Natural Sciences. We will not be asking for an exception to either the core curriculum or the 120 hour cap for baccalaureate degrees for this major.

The American Chemical Society (ACS) has an optional certification for chemistry degree programs. CSU's proposed program was designed in conformance with the guidelines established by the ACS, including the number of laboratory contact hours, participation in independent research, emphasis on biochemistry, availability of electives, and exposure to all sub-disciplines of chemistry. It is not possible to submit this program for ACS certification at this time because CSU does not meet certain requirements, such as owning subscriptions to a large variety of chemistry and chemistry-related journals, having access to a functioning Nuclear Magnetic Resonance (NMR) spectrometer, and providing adequate laboratory facilities for research. CSU is working to meet those requirements. State funding for the renovation of the existing teaching and research building was received in fiscal year 2009 and funding for the architectural planning for a new science building was received in fiscal year 2010. CSU has plans to create an instrumentation room that can support an NMR and to create new research laboratories. The Department of Natural Sciences is pursuing an instrumentation grant to purchase an NMR. The University will continue to monitor the ACS accreditation guidelines as the chemistry program develops, and it is anticipated that once CSU's chemistry program is established and viable, and the necessary resources are obtained, the program will be submitted for review for ACS certification.

Assessment of the chemistry major will utilize an exit examination, such as the American Chemical Society's Diagnostic of Undergraduate Chemistry Knowledge exam, or an equivalent content-based standardized instrument. In addition, senior exit interviews, graduation surveys, and alumni and employer surveys will be conducted to evaluate achievement of program outcomes. The results of these assessments will be used for program improvement. Immediate success of the program will be judged by the number of students choosing the chemistry program of study and on the ability of those students to successfully complete the program. The Department of Natural Sciences has begun building a Chemistry Advisory Committee to evaluate the program and suggest modifications and improvements once the program is approved and underway.

## **3. Description of how the program demonstrates demand and a justification of need in the discipline and geographic area and is not unnecessary program duplication.**

The employment rate for recent chemistry graduates is high. In 2002, only 1.1% of chemists were unemployed or seeking employment.<sup>2</sup> Graduates trained in chemistry have opportunities in industry, research, academia, government, patent law, medical/health services, pharmaceuticals, and other related areas. The predicted growth in the chemistry-related job market indicates a great demand both locally and nationally for people specifically trained in the chemical sciences (Table 1). In addition to the projected growth, the greater Atlanta area is already home to research branches of the Centers for Disease Control and Prevention, Environmental Protection Agency, United States Department of

---

<sup>2</sup> American Chemical Society Survey of Young Career Chemists, 2002.

Agriculture and several of the country's leading technological and medical universities. The curriculum of the proposed chemistry program is designed to prepare undergraduate students for graduate and professional schools or employment in the chemical sciences.

**Table 1.** Projected job growth in chemistry-related occupations.

Occupation	Projected Growth	
	In U.S. <sup>3</sup>	In Georgia <sup>4</sup>
Chemists	9.13%	4.0%
Chemical Educators	11.51%	28.3%
Chemical Technicians	5.82%	11.1%
Pharmacists	21.72%	28.7%
Physicians and Surgeons	14.24%	22.7%
Veterinarians	34.99%	13.1%

In the period from 1984 – 2005, the number of Bachelor degrees in chemistry awarded by degree-granting institutions fluctuated between 8,122 and 10,609. The number of B.S. Chemistry graduates is currently rising, and has increased by 6% over the last five years.<sup>5</sup> There is a need for a chemistry program at Clayton State University. More than 25 students have graduated with a minor in chemistry in the two years the University has offered the minor program. In spring 2008 a survey of 191 Clayton State students currently enrolled in seven chemistry courses (Principles of Chemistry I and II, Organic Chemistry I and II, Biochemistry, Forensic Chemistry, and Medicinal Chemistry) was conducted to further investigate student interest in the establishment of a chemistry program. This survey revealed that 42.4% of respondents would “definitely” select Chemistry as their major if it was available, or if it had been available at the time they chose their major. An additional 22.5% indicated they would “probably” choose the chemistry major.

With the implementation of this major, the University expects to attract both traditional and non-traditional students interested in chemistry as well as post-baccalaureate students and professionals seeking to enhance their scientific knowledge and increase their chemistry skill set. Student recruitment will occur primarily in the state of Georgia and the southern U.S. The fall 2007 CSU student body is 52.9% African-American, 28.3% white, 4.8 % Asian or Pacific Islander, 2.6% Hispanic, 4.4% multiracial and 7% unknown or other. The University’s diversity is viewed as a major strength, and it was this diversity that led *U.S. News & World Report* to rank CSU as having the most diverse student population among comprehensive baccalaureate-level colleges and universities in the Southern United States. A lack of diversity is represented in the nation’s existing chemistry workforce. Recent statistics show that only 20% of the chemical workforce under the age of 40 is composed of members of minority groups.<sup>6</sup> Based on the student population served by CSU, it is anticipated that the chemistry program will contribute significantly to enhancing the diversity of chemistry graduates in Georgia.

<sup>3</sup> National Employment Matrix, 2006-2016, US Bureau of Labor Statistics.

<sup>4</sup> Labor Market and Industry Occupational Outlook, 2004-2014, Georgia Department of Labor.

<sup>5</sup> National Center for Education Statistics, National Science Foundation.

<sup>6</sup> American Chemical Society Early Career Survey, 2002.

Letters of support for CSU's chemistry proposal have been obtained from the Georgia Institute of Technology, Centers for Disease Control and Prevention, Georgia Department of Agriculture, the Georgia Bureau of Investigation, and Kiel Laboratories, and will be included with the formal program proposal.

The proposed BS in Chemistry will not duplicate any program in the immediate service area of CSU. CSU serves the Southern Crescent region of Metropolitan Atlanta. The majority of CSU students reside in Clayton, Henry, South Fulton, South Dekalb and Fayette Counties. The closest university to this service area that offers a BS in Chemistry is Georgia State University. We do not anticipate a reduction in enrollment in GSU chemistry program as a result of this program. GSU is a research university. There is a need for a BS in chemistry offered at a state university system school that can serve undergraduate students from the Southern Crescent region of Metropolitan Atlanta.

**4. Brief description of institutional resources that will be used specifically for the program (e.g., personnel, library, equipment, laboratories, supplies & expenses, capital expenditures at program start-up and when the program undergoes its first comprehensive program review.)**

Existing full-time tenure-track chemistry faculty will provide the core chemical foundation for the program. The chemistry faculty at Clayton State is noted for the rigor and high quality of the courses they teach, both by student evaluations and administrator evaluations, and are well qualified to deliver this proposed curriculum. Within the current faculty, we have seven members with doctorates in chemistry or biochemistry. The existing faculty has the appropriate educational backgrounds to teach all of the courses planned for this new program.

The Clayton State University Library exists to serve the students, faculty and staff of CSU. The Library's print and non-print collections support the University's curriculum as well as the academic interests and reading needs of the University's students and faculty. Resources include over 700 subscriptions to newspapers and journals, over 19,000 magazines and journals available bound or in full-text electronically, and over 82,500 bound volumes. Because CSU has an existing minor in chemistry and major in biology, the library has a base collection of circulating books and relatively up-to-date reference works upon which to build. All Clayton State students have access to the GALILEO state-wide online reference service and the interlibrary loan program which provides access to the many scientific journals found at the other academic institutions in the state. Additional library support could come in the form of a chemical science database, such as SciFinder Scholar or the ACS abstract service.

The Department of Natural Sciences currently utilizes three laboratory rooms for chemistry courses. Major equipment items housed in these laboratories include a Gas Chromatograph/Mass Spectrometer, an FTIR Spectrophotometer, Fluorimeter and a UV-VIS Spectrophotometer. Chemists also have access to instruments housed in the biology laboratories, including electrophoresis and PCR equipment. The University has funding to renovate existing classroom space in the laboratory building to create two additional chemistry teaching laboratories, research space, and an instrument room. The renovation will be complete in the Fall of 2010. CSU will also receive 2.1 million dollars in the fiscal year 2010 budget to plan the construction of a new science building. This building will at least triple the number teaching labs and will create sufficient research space for the new major. A 33 million dollar science building is anticipated to be in the proposed budget for fiscal year 2011.

Classrooms at CSU are outfitted with modern projection systems, wireless internet, video and audio capabilities and meet the technological needs of the proposed chemistry courses.