

Indiana Commission for Higher Education

Program Description—Graduate Certificate in Chemistry

To Be Offered by Indiana University as a Collaborative Program at Several Campuses

1. Characteristics of the Program

- a. Campus(es) Offering Program—Joint Degree Shared by

Indiana University Bloomington
Indiana University East
Indiana University Kokomo
Indiana University Northwest
Indiana University South Bend
Indiana University Southeast

- b. Scope of Delivery—Statewide
c. Mode of Delivery—100% Online
d. Other Delivery Aspects—None
e. Academic Unit Offering Program—varies by campus:

IU Bloomington—College of Arts and Sciences
IU East—School of Natural Science and Mathematics
IU Kokomo—School of Sciences
IU Northwest—College of Arts and Sciences
IU South Bend—College of Liberal Arts and Sciences
IU Southeast—School of Natural Sciences

2. Rationale for the Program

- a. Institutional Rationale (Alignment with Institutional Mission and Strengths)
- Why is the institution proposing this program?

a. Program Goals:

The Graduate Certificate in Chemistry has two primary goals:

The Graduate Certificate in Chemistry will provide graduate-level instruction in chemistry to students interested in obtaining advanced skills and knowledge in this area. These may include instructors of chemistry teaching in community colleges and high school dual-credit instructors, as well as working professionals. For those students who are teaching or plan to teach chemistry, certificate courses will help them integrate new concepts and approaches into their teaching, thereby improving the quality of instruction and learning outcomes for their students.

The certificate allows instructors of introductory college-level chemistry courses to partially meet the faculty educational standards of many post-secondary institutions. These requirements usually

include a master's degree in the discipline, or a master's degree in another field (e.g., education) plus 18 hours in the discipline. With the increased attention that the Higher Learning Commission (HLC) and other accrediting bodies are giving to the issue of faculty qualifications, current faculty are seeking ways to meet the requirement.

Chemistry is one of the most highly enrolled dual-credit courses in Indiana. There are many dual-credit teachers across the state and throughout the country who can complete this certificate to meet HLC standards and deepen their understanding of chemistry.

These two goals are mutually reinforcing. In 2015, the HLC issued guidelines on “instructor qualification” in the effort to ensure that dual-credit courses continues to meet college-level expectations and outcomes even as the number of students completing these classes greatly increases. HLC guidelines mandate that individuals teaching bachelors-level classes for college-credit should hold at least a Master’s degree in the discipline in which they teach; however, the guidelines allow for instructors who hold M.S.Ed., and other Master’s degrees to gain the requisite disciplinary training by completing 18 graduate credits in discipline-specific courses.

- How is it consistent with the mission of the institution?

This certificate answers the charge of the [Indiana University Bicentennial Strategic Plan](#) to provide an excellent education that promotes retention and completion through innovative online instruction that accommodates the busy schedules and family demands of working Hoosiers.

With a focus on extending the reach of dual-credit and community college instruction in high-demand introductory level courses, this Graduate Certificate meets IU’s charge as a public university, which the *Bicentennial Strategic Plan* as follows:

IU is a public university in a deep sense; it exists to benefit all the people of the state, and the world beyond, and has a charge to continue its long tradition of engagement in the economic, social, environmental, and cultural life of all Hoosiers. This charge applies to all IU campuses, and it has special significance for the regional campuses. These campuses’ communities and regions rely on their respective campuses for undergraduate and professional education that addresses regional needs.

The Graduate Certificate in Chemistry is proposed as a joint degree program to be delivered by six IU campuses—Bloomington, East, Kokomo, Northwest, South Bend and Southeast. By design, this joint program provides efficiencies of scale while maintaining the unique characteristics of the participating campuses.

- How does this program fit into the institution’s strategic and/or academic plan?
- How does this program build upon the strengths of the institution?

The [Indiana University Bicentennial Strategic Plan](#) identified the integration of new educational technologies and collaborative platforms and the development of a robust program of online education as essential tools to ensure that the university and its faculty continue to serve the citizens of the state of Indiana.

As a part of this initiative, the university developed IU Online to serve as administrative home “coordinating and catalyzing IU’s efforts in this area.” The plan summarizes the specific benefits as follows:

Online and hybrid delivery allow IU through IU Online to expand its offerings across campuses in a cost-effective way, through developing systems of shared online resources. IU will complete through IU Online a university-wide framework for online education, to enhance instructional quality and support, and create scalable economies in course and program delivery for all campuses.

See Appendix 1 for web addresses to:

- [Indiana University Bicentennial Strategic Plan](#)
- [January 2016 IU Online: A Collaborative Model for Online Education at Indiana University.](#)

b. State Rationale

- How does this program address state priorities as reflected in the ICHE’s 2016 strategic plan [Reaching Higher, Delivering Value.](#)

The proposed collaborative Graduate Certificate in Chemistry will address each one of the four goals cited in *Reaching Higher, Delivering Value*.

- I. Completion—Faculty designed the curriculum of the collaborative Graduate Certificate in Chemistry to help improve instruction in college-level Chemistry courses taught in Indiana high schools and community colleges as a part of the dual-credit program, which will in turn promote progress to degree and on time graduation at two- and four-year institutions.
- II. Competency—The collaborative Graduate Certificate in Chemistry will serve instructors teaching introductory college-level Chemistry courses. In turn, their students will be better prepared to succeed in a wide-variety of degree programs and careers that build on a strong foundation in the concepts and methods of the chemical sciences.
- III. Career— The collaborative Graduate Certificate in Chemistry will allow instructors to meet the HLC qualification standards so that they can continue to teach dual-credit courses in their schools.
- IV. Delivering Value—Dual-credit courses provide high school and community college students with affordable, transferable credits that they can apply towards completion of both two- and four-year college degrees. Due to the certificate’s 100% online mode of delivery, dual-credit instructors will be able to further their education with minimal disruption to their professional and family lives. In addition, IU’s Advanced College Project has secured a number of grants and other sources of funding that will subsidize tuition costs for affiliated dual-credit instructors through the first few years of this initiative.

c. Evidence of Labor Market Need

- i. National, State, or Regional Need

- Is the program serving a national, state, or regional labor market need?

The collaborative online Graduate Certificate in Chemistry will provide the discipline-specific graduate coursework that dual-credit and community college instructors need to meet the disciplinary expertise component of the HLC's instructor qualification standards. State legislatures across the nation place increased emphasis on the role of dual-credit coursework as a means to reduce time to degree, and taken together with recent changes in HLC accrediting practices, demand for these online programs is likely to be steady in the foreseeable future.

ii. Preparation for Graduate Programs or Other Benefits

- Does the program prepare students for graduate programs or provide other benefits to students besides preparation for entry into the labor market?

This certificate will serve secondary and community college instructors. It is unlikely that many of these students will opt to apply for a Ph.D. program in Chemistry, but assignments completed for the certificate could be used to prepare an application dossier. Admission to the Graduate Certificate Program will not result in admission to IU Bloomington's doctoral programs.

iii. Summary of Indiana DWD and/or U.S. Department of Labor Data

- Summarize the evidence of labor market demand for graduates of the program as gleaned from employment projections made by the Indiana Department of Workforce Development and/or the U.S. Department of Labor?

See Appendix 2: Brief Market and Demand Analysis

iv. National, State, or Regional Studies

- Summarize any national, state, or regional studies that address the labor market need for the program.

In an emergency presentation to the Indiana Commission for Higher Education on October 8, 2015, two representatives from the Center for Excellence in Learning and Learning, Dr. Janet Boyle, Executive Director and Tyonka M. Perkins, Interim Director of Early College presented findings about the potential impact of these HLC changes based on a credential analysis of Indiana, dual-credit instructors. Boyle and Perkins found that:

- Only 30% of current instructors hold an M.A. in their field;
- 1,193 instructors hold M.A.T.s, and other graduate degrees in the field of education, but lack the 18 graduate credit hours in the specific content area in which they teach;
- A further 600 instructors have neither a Master's degree nor the requisite content area credit hours;
- In all, more than 43,000 Indiana students currently take dual-credit courses with instructors who do not meet the HLC standards.

To meet the needs of these instructors, and by extension, their students, IU's Office of Online Education (OOE) and Advanced College Project (ACP) identified the highest priority dual-credit courses in terms of statewide enrollments, and asked departments and campuses to consider developing online graduate certificates that will satisfy HLC standards for content area instruction.

In the three years since the 2015 ICHE presentation, ACP has collected the following data pertinent to both need and demand:

- Indiana has seen a nearly 25% increase in the overall number of high school students taking dual-credit courses;
- During the 2017-18 academic year, approximately 100,000 Hoosiers enrolled in dual-credit courses and among these 2700 students enrolled in dual-credit Chemistry courses;
- Approximately 160 ACP affiliated dual-credit teachers could use enrollment in the online Graduate Certificate in Chemistry to meet HLC standards.

See Appendix 2: Brief Market and Demand Analysis

3. Similar and Related Programs

a. List of Programs and Degrees Conferred

i. Similar Programs at Other Institutions

Other universities offer non-degree graduate coursework to individual teachers, but these online Graduate Certificates that will stack into the Master of Liberal Studies and other Master's degree programs (currently in development) are unique to IU.

- CHE staff will summarize data from the Commission's Program Review Database on headcount, FTE, and degrees conferred for similar programs in the public sector, as well as information on programs in the non-profit and proprietary sectors, to the extent possible.

See: CHE Appendix A: Similar Programs at Other Institutions.

ii. Related Programs at the Proposing Institution

- CHE staff will summarize data from the Commission's Program Review Database on headcount, FTE, and degrees conferred for related programs at the proposing institution.

See CHE Appendix B: Related Programs at the Proposing Institution,

b. List of Similar Programs Outside Indiana

- If relevant, institutions outside Indiana (in contiguous states, MHEC states, or the nation, depending upon the nature of the proposed program) offering (on-campus or distance education) programs that are similar:

University of Texas-El Paso
Bowling Green State University

c. Articulation of Associate/Baccalaureate Programs

Not Applicable.

d. Collaboration with Similar or Related Programs on Other Campuses

- Indicate any collaborative arrangements in place to support the program.

The Office of Online Education, the Office of Collaborative Academic Programs, are partnering with the Advanced College Project to promote and administer grants from the ICHE and the Department of Education that can provide funds to support graduate study for dual-credit and STEM instructors across the state.

The collaborative online Graduate Certificate in Chemistry will be listed with the other 100% online programs posted at IU Online web portal and will receive marketing and recruitment support from the Office of Online Education (OOE). OOE staff and representatives will be trained to answer initial responses regarding the program and refer prospective students to the campuses for follow-up. OOE will partner with this academic program to provide marketing and recruitment campaigns that reinforce the overall recruitment message and maximize the utilization of OOE, campus, and program resources. OOE will provide effectiveness tracking of marketing campaigns and establish Return on Investment for marketing and recruitment of IU Online students.

To provide a suite of services to students in 100% online collaborative degrees, OOE partners with providers on several IU campuses. The office provides 24/7 tech support for students via phone, email and chat. During the 2017-18 academic year, OOE rolled out the following support for students pursuing an IU Online program:

- onboarding/orientation to online education at IU,
- coaching and mentoring services,
- math and writing tutoring,
- internship/ coop management, and
- career services.

In addition, these partnerships will also coordinate student conduct, ADA compliance, and student advocacy for students enrolled at multiple campuses. With regard to student conduct and student grievances, OOE will facilitate conversations among campuses, and, to the extent possible, seek to resolve the issue using existing campus processes

4. Quality and Other Aspects of the Program

a. Credit Hours Required/Time To Completion

Working professionals will be able to complete the 18 credit hour Graduate Certificate in Chemistry in 15-18 months of consecutive part-time enrollment. Students who can take more than one course at a time may complete the certificate more quickly.

b. Program Goals

The coursework in the Graduate Certificate in Chemistry will increase the student's theoretical knowledge in the discipline of Chemistry. The certificate will serve two primary audiences:

- A). Dual-Credit and Community College Instructors teaching courses in Chemistry, and
- B) Working professionals who seek to advance their knowledge.

The Graduate Certificate in Chemistry will support the reach and quality of Indiana's dual-credit courses by providing:

- A practical and economical online program of study to high-skilled and motivated teachers with advanced training in the field of Chemistry;
- A challenging and coherent curriculum that meets the HLC's dual-credit accreditation standards for graduate training in Chemistry.

c. Learning Outcomes

Upon completion of the certificate, students will be able to demonstrate:

I. Expertise in chemistry

Students will be able to:

- 1a Demonstrate the ability to break down and analyze chemical concepts and processes.
- 1b. Demonstrate an achievement of breadth of knowledge across a selection of sub disciplines in Chemistry.
- 1c. Design assignments to teach relevant chemical concepts.

II. Effective oral and written scientific communication skills

Students will be able to:

- 2a. Retrieve information from the chemical literature.
- 2b. Communicate understanding of literature.

III. Ability to analyze data critically and to design experiments independently

Students will be able to:

- 3a. Develop methodological approaches and solve problems.
- 3b. Critically analyze a journal article.

IV. Application of the impact of chemistry on the society

Students will be able to:

- 4a. Analyze processes in everyday life using chemical principles.

- 4b. Demonstrate an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community.
- 4c. Evaluate chemistry-related press releases and news media for veracity and best practices in research.

d. Pre-requisite coursework

Bachelor's degree.

e. Degree Requirements

Students will have to complete 18cr in the discipline to earn the Graduate Certificate in Chemistry. Capstone will be a required course (CORE). Students will pick additional 15cr from remaining courses (ELECTIVES).

CORE COURSE (3 cr.)

CHEM-T 590 Chemistry Capstone

ELECTIVE COURSES (Up to 15cr)

CHEM-T 510 Inorganic Chemistry (3cr)
CHEM-T 520 Organic Synthesis (3cr)
CHEM-T 530 Organic Spectroscopy (3cr)
CHEM-T 540 Physical Chemistry (3cr)
CHEM-T 550 Introductory Biochemistry (3cr)
CHEM-T 555 Survey in Chemistry VT: Organic, Analytical, Inorganic, etc (3cr)
CHEM-T 560 Environmental Chemistry (3cr)
CHEM-T 570 Nuclear Chemistry (3cr)

Appendix 1: Web Addresses Strategic Plan and IU Online Policies

The [Indiana University Bicentennial Strategic Plan](https://strategicplan.iu.edu/plan/education.html) can be accessed at <https://strategicplan.iu.edu/plan/education.html>

The IU policy paper on online collaborative programs, “[January 2016 IU Online: A Collaborative Model for Online Education at Indiana University](https://uaa.iu.edu/academic/ooe/docs/ooe_model.pdf)” can be viewed at https://uaa.iu.edu/academic/ooe/docs/ooe_model.pdf.

Appendix 2: Brief Market and Demand Analysis

Degree: Graduate Certificate in Chemistry

CIP Code used: 40.0501 - Chemistry, General

SOC Code(s) used: 25-2031.00 - Secondary School Teachers, Except Special and Career/Technical Education

Campus: IU Office of Online Education

Delivery: Online

OUTLOOK

Source: <http://www.onetonline.org/>

National Outlook: Above average Indiana

Outlook: Above average

Average Salary: National: \$59,170 annual; Indiana: \$50,850

Projected growth (2016-2026): National: +8%; Indiana: +7%

Projected annual job openings (due to growth and net Replacement): National: 79,500

Indiana: 510

COMPETITION

Source: IPEDS College Navigator¹

Other Indiana institutions offering program:

0 Indiana campuses offer this degree at the “Post-baccalaureate Certificate” level (none online)

Number of institutions offering degree nationally:

Certificates: 7 (0 online)

2015-17 IPEDS Completions data

Post-baccalaureate or Post-Master’s Certificate: 19 (0 from Indiana²)

Notes:¹ The College Navigator does not differentiate certificate LEVEL and may include undergraduate certificates.

² Indiana completions are reported by IUPUI as Post-Baccalaureate Certificates.

CHE Appendix A: Similar Programs at Other Institutions.

CHE Appendix B: Related Programs at the Proposing Institution.