

Routing for On-Campus Approval of Degree Program Actions

Type of Action: Enter "X" for Action Type(s) and list Title and Prefix(s) as indicated

<input type="checkbox"/> New Degree Program	Proposed Program Title _____
<input checked="" type="checkbox"/> New Certificate Program	Proposed Certificate Program: Online Graduate Certificate in Biology for Teachers
<input type="checkbox"/> New Minor Program	Proposed Minor Program Title _____
<input type="checkbox"/> Change in Degree Program Title	Current Degree Program Title _____
<input type="checkbox"/> Change in Certificate Program Title	Current Certificate Program Title _____
	Proposed Certificate Program Title _____
<input type="checkbox"/> Change in Minor Program Title	Current Minor Program Title _____
	Proposed Minor Program Title _____
<input type="checkbox"/> Change in Course Prefix	Current Course Prefix _____ Proposed Course Prefix _____
<input type="checkbox"/> Program Discontinuation	

Proposed Effective Date July 2018 Program Contact: Elizabeth Thompson, PhD

Proposed CIP Code (see <https://nces.ed.gov/ipeds/cipcode/default.aspx?v=55>): 26.0101

Routing of Action: Indicate date when the following occurs

Completed Request to Plan and 1-page Concept Paper

_____ Council of Dean's- Approval to Plan

Completed Proposal

8/19/17 Department Head endorses*
8/19/17 College Curriculum Committee (undergraduate or graduate) recommends*
8/24/17 College Dean endorses*

Proposal moves to Undergraduate or Graduate office for routing

8/15/17 Recommended by Vice Provost, DELTA, if applies*
 _____ Substantive Change Review Team (SCRT) informed
 _____ If SACS notification is required, SCRT prepares letter for Chancellor to send to SACS
 _____ University Courses & Curriculum Committee or Administrative Board of the Graduate School recommends
 _____ Associate Deans Council or Graduate Operations Council informed
 _____ Dean (Graduate School or DASA) approves*

Proposal move to the Executive Vice Chancellor Provost's office for routing

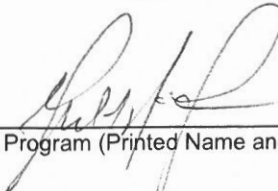
_____ Vice-Provosts informed
 _____ Deans' Council recommends*
 _____ Executive Vice Chancellor and Provost approves*
 _____ Chancellor's Executive Officer's (EOM) recommend
 _____ University Council informed
 _____ Board of Trustees subcommittees recommend
 _____ Chancellor approves*
 _____ Accreditation Liaison notifies SACS, if applicable
 _____ Submitted to UNC-General Administration by Provost's Office

* Signature is required on the signature page for the action

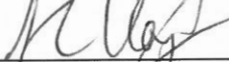
**Online Graduate Certificate in Biology for Teachers
North Carolina State University**

This request has been reviewed and approved by the appropriate campus committees and authorities.

Endorsed By:

GERALD A. LeBlanc  8/28/17
Head, Department/Director of Graduate Program (Printed Name and Signature) Date


Recommended By:

Alan L. Ward  9/11/2017
Chair, College Graduate Studies Committee (Printed Name and Signature) Date

Endorsed By:

John M. Blondin  8/29/17
College Dean (Printed Name and Signature) Date

Recommended By:

Thomas K. Miller III  9/15/17
Vice Provost, DELTA (if DE degree) (Printed Name and Signature) Date

Approved By:

Dean of the Graduate School (Printed Name and Signature) Date

Recommended By:

Dean's Council (Printed Name and Signature) Date

Approved By:

Executive Vice Chancellor and Provost (Printed Name and Signature) Date

Approved By:

Chancellor (Printed Name and Signature) Date

**NC State University
Certificate Proposal Form**

Certificate Title: Online Graduate Certificate in Biology for Teachers

New:

Revision:

Classification of Instructional Programs (CIP) Discipline # (**6 digits**): 26.0101

*Please ensure that you select the appropriate CIP code for your certificate program. Please consult this website for more information about CIP codes:

<https://nces.ed.gov/ipeds/cipcode/default.aspx?y=55>

Certificate Type:

On-Campus:

Distance:

On-Campus & Distance:

Proposed Effective Date: Summer 2018 (July 2018)

Director of the Certificate Program: Elizabeth Thompson, PhD _____

Program Coordinator (if different from Director):

Graduate Services Coordinator: Margaret Huffman

College: College of Science

Department/Program: Biological Sciences

Catalog Description:

The Graduate Certificate in Biology for Teachers will provide additional training in biological sciences to K-12 teachers and other educators. The certificate will provide recognition to those individuals who complete 12 credit hours of coursework in graduate level biology, with the option to complete up to 18 credit hours for those interested in teaching AP courses or teaching at the community college level. Students will choose between four and six courses (3 credits each) in topic areas that align with their own goals. Course topics will include animal behavior, communicable and non-communicable diseases, toxicology, evolution, genetics and microbiology, and faculty will continue to develop new courses to increase options.

Projected Enrollment:

On-Campus	Yr. 1-__	Yr. 2-__	Yr. 3-__	Yr. 4-__
Distance	Yr. 1-10	Yr. 2-20	Yr. 3-30	Yr. 4-40

Attachments:

- Proposal Document
- Statement of other departments likely to be affected and summary of consultation with those departments
- Program-level assessment (Education Advisory Board Study)
- Campus Routing Form
- Signature Page

Proposal for Graduate Online Certificate in Biology for Educators

Program Justification

The US Department of Education and the North Carolina Board of Instruction both predict large increases in STEM related jobs over the next 5-10 years. In preparation for this increase, the North Carolina State Board of Education has created a STEM education plan, which includes three items of high priority. These items include: improving STEM achievement of students, bolstering community understanding and support, and connecting, leveraging, and increasing STEM resources. To achieve the goal of improving STEM achievement in students, we need an adequate number of teachers highly trained in STEM disciplines, especially the biological sciences. Market research performed by the Education Advisory Board has corroborated that there is a strong need for STEM discipline courses for teachers. Our proposed online Graduate Certificate in Biology for Educators will provide not only a much-needed opportunity for educators in all settings to increase their background in biological sciences, but it may also serve as a bridge for those wanting to pursue additional degrees in scientific disciplines or a graduate degree in education.

This certificate will offer educators the opportunity to take courses in biological sciences designed by faculty in the Department of Biological Sciences.

The online nature of this certificate program will (1) allow us to offer the program regionally, statewide and nationally, and (2) will increase accessibility to working educators who may have little flexibility in their schedule.

Program Objectives

Completion of this certificate program will allow teachers to improve their literacy in biological sciences. With this enhanced knowledge, they will be able to bring improved content and lesson plans to their students. Those who enroll in this certificate program will choose courses to complement their existing biology background and expand their knowledge in areas in which they may have a special interest or in which they feel the need for additional training. Ultimately, the NC State Graduate Certificate in Biology for Educators will help them develop a stronger knowledge base to use in developing learning activities, expanding upon those they already implement, and presenting scientific material to their students in new ways.

As an added benefit, this program will offer courses that could be completed by teachers looking to satisfy their subject-specific continuing education credits. North Carolina requires teachers to complete subject-specific continuing education credits every five years, and completion of one of these courses would satisfy that requirement.

Finally, courses offered within the certificate program will be available to students involved in other graduate education programs (for example, STEM M.Ed. and Ph.D. and Elementary Education Science Specialist M.Ed.), and would provide an additional pool of much-needed online courses from which such students could select to fulfill their requirements for credit hours in the sciences.

Graduate Catalog Description

The Graduate Certificate in Biology for Teachers will provide additional training in biological sciences to pre-college teachers, community college instructors, and other educators (e.g., at museums, zoos, national parks). The certificate will provide recognition to those individuals who complete 12 credit hours of coursework in graduate-level biology, with the option to complete up to 18 credit hours for those interested in teaching AP courses or teaching at the community college level. Students will choose three or five courses (3 credits each) in topic areas that align with their own interests. Students also will be required to complete the capstone course, BSC 580 Neurobiology of Learning (3 cr).

Projected Enrollment

Year 1	Year 2	Year 3	Year 4
10	20	30	40

Admissions Requirements

Applicants must meet one of these three requirements:

- have earned a bachelor's degree from an accredited college or university with minimum 3.0 GPA in the last 60 credit hours of undergraduate study
- be a graduate student in good standing in an education-related masters or doctoral program
- have earned a master's degree from an accredited college or university

In addition, applicants will be required to submit a one-page statement describing how this program will benefit their personal or professional development and career goals.

Program of Study

The graduate certificate requires a minimum of 12 credit hours, including the capstone course BSC 580 (3 cr) and at least 9 credit hours of Electives chosen by the certificate student. No more than one 400 level course may be applied to the certificate. .

Electives (minimum 9 cr): **NOTE to committee – BSC 514, 516, 546, and 580 are in the approval process; 520, 544, and 548 are in development, as are other courses to be added later. If we can code the applicable electives as BSC 5**, that would be most efficient. But we understand that courses that are currently (or soon to be) available need to be listed here.*

BSC 514 Studying Animal Behavior (3 cr)

BSC 516 Toxics, Human Health and the Environment (3 cr)

BSC 520 Model Organisms in Cellular and Molecular Biology (3 cr)

~~**BSC 527** Biological Illustration: Learning Through Close Observation (3 cr)~~

BSC 544 Cancer Biology (3 cr)

BSC 546 Humans and Disease: Communicable Diseases (3 cr)

BSC 548 Humans and Disease: Non-Communicable Diseases (3 cr)

400-level option (only one 400-level course can count towards the certificate):

BIO 405 - Functional Histology
 BIO 424 - Endocrinology
 MB 411 - Medical Microbiology
 MB 441 - Immunology
 MB 451 - Microbial Diversity
 TOX 401 - Principles of Toxicology
 TOX 415 - Environmental Toxicology and Chemistry

Capstone Course (Required):

BSC 580 Neurobiology of Learning (3 cr) will be taken as the final course in the certificate program.

Table 1. Previous Enrollments in BSC courses currently in the approval process

Course	Summer I 2015	Summer I 2016	Summer II 2016	Summer I 2017	Summer II 2017
BSC 514 Animal Behavior (ZO 592 601)	18	18	X	20	X
BSC 516 Toxics, Health and the Environment (ZO 592 651)	X	X	X	8	X
BSC 546 Humans and Disease: Communicable Diseases (ZO 592 603)	X	X	13	23	14
BSC 580 Neurobiology of Learning	X	X	X	X	X
X = Not offered					

Academic Performance

1. Award of a Graduate Certificate requires a GPA of at least 3.0 on all courses completed as part of the certificate program
2. The minimum grade to receive certificate credit for any course is "C-"
3. None of the required 12 hours may be taken S/U or "credit only"
4. A maximum of 6 credits of previous relevant NC State coursework may be transferred into the certificate
5. Transfer credits from other institutions are not allowed for the certificate
6. All students must be registered through NC State University
7. All Graduate Certificate requirements must be completed within 4 calendar years from the date the student begins coursework for the certificate, and includes any semesters in which transferred credits were taken.

Application and Completion Process

1. All new applicants must submit a certificate application for acceptance. The applicant must apply via the Graduate School application, found at: <https://projects.ncsu.edu/grad/applygrad.htm>
2. Those applicants who are enrolled in other graduate programs at NC State must provide the Graduate Student Certificate Plan Data Entry form, found at: <https://grad.ncsu.edu/faculty-and-staff/forms/graduate-school-forms/>

We will encourage all students participating in the certificate program to contact the Certificate Coordinator to determine registration procedures, course availability and registration dates.

Once all certificate requirements have been met, the Certificate Coordinator will notify the Dean of the Graduate School that the student has successfully completed the certificate program.

Responsibility for Administration and Resources

This certificate program will be offered by the Department of Biological Sciences. It will be administered by the Assistant Department Head for Biological Sciences (Jane Lubischer, PhD) and the Certificate Coordinator (Elizabeth Thompson, PhD). The Certificate Coordinator will perform the following:

- Make admission decisions to the certificate program
- Notify the Dean of the Graduate School of the student's completion of certificate requirements
- Update program website as needed
- Coordinate the scheduling of courses
- Function as a liaison between the Department of Biological Sciences and the College of Education
- Seek, and oversee spending of, funds in support of course development, marketing, etc.

Program or Policy Changes for this Certificate

All changes in the Graduate Certificate in Biology for Educators or its policies will be discussed and determined amongst participating faculty and the Certificate Coordinator, and will be channeled through all appropriate college committees and the Administrative Board of the Graduate School.

Outcomes Assessment Plan

Objectives

1. In this certificate program, students will expand their knowledge of the biological sciences so that they can then apply that knowledge to develop or improve activities and strategies used in their own teaching.
2. The certificate program will provide an educational experience that satisfies the expectations of its graduates.

Learning Outcomes

1. After completing this certificate program, graduates will be able to:

- a. Identify three areas within the biological sciences in which their knowledge has been improved by courses taken for the certificate.
- b. Describe how they have used (or plan to use) what they have learned from certificate courses to improve their own teaching.
- c. Explain fundamental principles in the neurobiology of learning and relate them to our understanding of how people learn.
- d. Describe how they have used (or plan to use) an understanding of the science of learning to improve their own teaching.

Outcome	Evidence to be Collected	Source of Evidence	Frequency of Collection
1a (biological knowledge)	Assignments in BSC 580 and assessments completed in other certificate courses	Students	At completion of certificate (when the student enrolls in BSC 580) and at completion of each course taken.
1b (use of biological knowledge)	Assignments in BSC 580	Students	At completion of certificate (when the student enrolls in BSC 580).
1c (science of learning)	Assignments in BSC 580	Students	At completion of certificate (when the student enrolls in BSC 580).
1d (use of their understanding of the science of learning)	Assignments in BSC 580	Students	At completion of certificate (when the student enrolls in BSC 580).

2. After completing this certificate program, graduates are expected to:

- Be satisfied with the usefulness of the certificate program in enabling them to achieve their personal or professional goals
- Be sufficiently satisfied with the certificate program to recommend it to others with similar goals
- Be satisfied with the appropriateness of the courses available through the program.
- Be satisfied with the frequency and timeliness of courses offered for the certificate
- Be satisfied with the quality of teaching in certificate courses

All of these outcomes will be assessment through an exit survey administered by the Graduate School annually.



DATA SNAPSHOT

Market Demand for an Online Graduate Biology Certificate for K-12 Teachers

Analysis of Regional Employer Demand

COE Forum

Helen Sdvizhkov

Market Research Associate

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Market Research Manager

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1) Research Methodology

Project Challenge Leadership at North Carolina State University approached the Forum as they considered launching a new graduate biology certificate program for K-12 teachers. Through quantitative data analysis and qualitative research interviews, the Forum sought to assess the market demand for a graduate biology certificate program for K-12 teachers.

EAB's market research function provides insights which guide strategic programmatic decisions at member institutions. The Forum combines qualitative and quantitative data to help administrators identify opportunities for new program development, assess job market trends, and align curriculum with employer and student demand.

Reports occasionally use data from the United States Census Bureau and United States Bureau of Labor Statistics data to explore occupation and job trends. Market research reports may also incorporate Integrated Postsecondary Education Data System (IPEDS) data to assess student enrollment, demographics, and completion rates across competitor programs.

Methodology and Definitions **Methodology:** Through qualitative interviews with administrators and secondary research, the Forum sought to identify student and program characteristics for certificate- and master's-level programs for biology or science educators.

Project Sources The Forum consulted the following sources for this report:

- EAB's internal and online research libraries (eab.com)
- National Center for Education Statistics (NCES) (<http://nces.ed.gov/>)
- Profiled Institutions:
 - Boston University, Graduate Certificate in Biology Education, accessed 7 February 2017, <https://www.bu.edu/academics/sed/programs/science-education/graduate-certificate-in-biology-education/>.
 - Drexel University, Post-Bachelor's Teaching Certificates: Secondary Education, accessed 7 February 2017, http://catalog.drexel.edu/graduate/schoolofeducation/postbacteachingcert/?_ga=1.160243069.1314438696.1475085995.
 - Indiana Wesleyan University, Graduate Biology Certificate, accessed 7 February 2017, <https://www.indwes.edu/adult-graduate/programs/graduate-certificate-biology/>.
 - Jefferson College of Health Sciences, Graduate Certificate in Biology, accessed 7 February 2017, <http://www.jchs.edu/degree/graduate-certificate-biology>.
 - Mississippi State University, Master of Science, General Biology, Teachers in Biology, accessed 7 February 2017, <http://distance.msstate.edu/msgb/>.
 - Montana State University, Online Graduate Certificates in Science Teaching, accessed 7 February 2017, <http://eu.montana.edu/nten/certificates/>.
 - Oregon State University, Master of Science in Education, accessed 7 February 2017, <http://education.oregonstate.edu/master-science-education>.

- Temple University, Secondary Education (MED), accessed 7 February 2017, <http://education.temple.edu/seced/secondary-education-med-science-grades-7-12>.
- University of Illinois Urbana Champaign, Online Master of Science in Teaching Biology Program, accessed 7 February 2017, <http://omst.sib.illinois.edu/about/>.
- University of Nebraska, Science for Educators Specialization, MAS, accessed 7 February 2017, <http://online.nebraska.edu/program/university-of-nebraska-lincoln-science-for-educators-specialization-mas-master-other-1436403146107>.
- Washington University in St. Louis, Graduate Certificate in Math and Science Education, accessed 7 February 2017, <http://ucollege.wustl.edu/programs/certificates/math-science-education>.

Profiled Institutions

The Forum interviewed program directors or profiled programs via secondary research at the following institutions:

A Guide to Institutions Profiled in this Brief¹

Institution	Location	Approximate Institutional Enrollment (Undergraduate/Total)	Classification
Boston University	Northeast	18,000 / 32,000	Doctoral Universities: Highest Research Activity
Drexel University	Mid-Atlantic	16,500 / 25,500	Doctoral Universities: Higher Research Activity
Indiana Wesleyan University	Midwest	10,000 / 14,500	Master's Colleges & Universities: Larger Programs
Jefferson College of Health Sciences	South	1,000 / 1,000	Special Focus Four-Year: Other Health Professions Schools
Mississippi State University	South	17,500 / 21,000	Doctoral Universities: Higher Research Activity
Montana State University	Mountain West	13,500 / 15,000	Doctoral Universities: Higher Research Activity
Oregon State University	Pacific West	24,500 / 29,500	Doctoral Universities: Highest Research Activity
Temple University	Mid-Atlantic	28,500 / 38,000	Doctoral Universities: Highest Research Activity
University of Illinois Urbana Champaign	Midwest	33,500 / 46,000	Doctoral Universities: Highest Research Activity
University of Nebraska	Midwest	20,00 / 25,500	Doctoral Universities: Highest Research Activity
Washington University in St. Louis	Midwest	7,500 / 14,500	Doctoral Universities: Highest Research Activity

1) National Center for Education Statistics.

2) Executive Overview

Create an online graduate biology certificate program to best serve working teachers and to align with competitors. Profiled programs offer certificate- and master's-level programs designed for working teachers online so that teachers do not need to travel to campus. High school teachers compose the majority of program enrollments at profiled institutions. At **Montana State University**, for example, high school teachers account for 70 percent of enrollments within the graduate certificate programs in science teaching. Include optional synchronous features, such as live lectures or question and answer sessions with faculty, to enhance student and faculty interaction without the need for on-campus components.

Launch an 18-credit certificate to attract educators who need graduate biology content credits to teach at the Advanced Placement and community college levels. Profiled graduate programs for teachers attract community college and extension educators. For example, community college instructors compose 30 percent of program enrollments at **Montana State University**. Teaching at the community college level requires 18 credits of graduate subject matter coursework. Therefore, profiled institutions include 18 credits of graduate content knowledge within certificate- or master's-level programs for science and biology educators. To further appeal to community college educators, emphasize that the Bureau of Labor Statistics projects a 16 percent employment growth for the "biological science teachers, postsecondary" occupation from 2014 to 2024. The BLS estimate significantly exceeds the six and a half projected employment growth for all occupations in that time frame.

Offer a larger course selection during summer sessions and spring semester to align with teacher schedules. Summer courses allow teachers to pursue graduate studies outside of the academic year. During the academic year, teachers more commonly pursue spring over fall courses since fall courses coincide with the busiest time of the school year. Contacts at **Montana State University** report that graduate certificate students most commonly enroll in summer courses, followed by spring and winter semester courses.

Develop a social media marketing campaign to increase prospective student awareness of the graduate biology certificate program. Prospective students rely heavily on online resources to learn about continuing education programs. Furthermore, administrators of continuing online education units report an increasing number of applicants who do not contact the institution prior to applying. Market the program through social media platforms, such as Facebook, Twitter, and YouTube, to ensure distribution of program information to prospective students. A social media campaign will also differentiate **North Carolina State University** from competitors who cite program websites and word-of-mouth as primary marketing strategies. Administrators at profiled institutions report the need for more marketing efforts and plan to introduce new marketing campaigns in the future.

3) Program Characteristics

Modality


Develop an Online Graduate Biology Certificate to Align with Competitors


Launch an online graduate biology certificate to cater to the working teachers likely to enroll in the program. While profiled institutions that prepare students for teaching licensure offer on-campus programs, administrators predominantly offer programs intended for current science teachers online. An online modality provides a convenient way for employed teachers and those at a distance to enroll in science educator programming. For example, 40 percent of online Master of Science Teaching Biology students at the **University of Illinois at Urbana-Champaign** reside out of state. Administrators at **Indiana Wesleyan University** also cite the online format as a more financially feasible program model due to the increased recruitment area.

Consider optional synchronous program components, rather than on-campus program features, to encourage student and instructor interaction within the online format. Though students in the **Montana State University** science teaching programs can take on-campus courses, students generally only enroll in online courses. At the University of Illinois at Urbana-Champaign, instructors offer a weekly synchronous lecture, discussion, or review session online. About 80 percent of students participate in the synchronous course components and provide positive feedback. Students unable to attend the live session may listen to a recording.

Profiled Program Formats

Profiled Institutions

Licensure Preparation	Institution	Program Name	Modality
No Licensure Preparation 	Indiana Wesleyan University	Graduate Biology Certificate	Online
	Montana State University	Graduate Certificate in Science Teaching in: <ul style="list-style-type: none"> • Chemistry • Earth Science • Elementary School Science • Life Science • Physics 	Online; Hybrid
	Jefferson College of Health Sciences	Graduate Certificate in Biology	Hybrid
	Washington University in St. Louis	Graduate Certificate in Science Education	In-person
	Washington University in St. Louis	Master of Science in Biology for Science Teachers, K-8	Hybrid
	Mississippi State University	Master of Science in General Biology for Teachers	Online
	University of Illinois at Urbana-Champaign	Master of Science in Teaching Biology	Online
	University of Nebraska	Master of Applied Science, Science for Educators Specialization	Online
	Indiana Wesleyan University	Master of Education – Major in Biology	Online

Licensure Preparation	Institution	Program Name	Modality
Licensure Preparation 	Drexel University	Post-Bachelor's Teaching Certificate - Secondary Education with Biology Certification Area	In-person; Online
	Boston University	Graduate Certificate in Biology Education	In-person
	Oregon State University	Master of Science in Education in Science Education with subject matter endorsements in: <ul style="list-style-type: none"> • Biology • Chemistry • Integrated Science 	In-person

Credit and Course Requirements

Develop an 18-Credit Certificate to Confer Graduate Credits Necessary to Teach Advanced Placement and College Courses

An 18-credit certificate program would allow **North Carolina State University** to recruit educators who wish to teach Advanced Placement and college courses into the program. The Higher Learning Commission requires educators to complete 18 graduate-level credit hours of subject-specific coursework to teach community college classes. Profiled institutions with certificate and master's-level offerings often include 18 credits of graduate content knowledge in the program curricula.

Advertise the certificate courses to high school teachers who aim to secure continuing education credits. North Carolina high school teachers must complete three subject-specific renewal credits and five general credits every five years; one semester hour equates to one and a half units of renewal credit.² The three subject-specific renewal credits must provide teachers with content knowledge, as well as skills to facilitate student learning (i.e., standards 3 and 4 of the [North Carolina Professional Teaching Standards](#)). The official webpage for [Learning Forward](#), previously the National Staff Development Council, provides additional information on standards for professional learning for North Carolina teachers.

2) [Update or renew your professional educator license](#)

Graduate Certificate- and Master's-Level Degree for Science Educator Program Credit and Course Requirements

Profiled Institutions

Institutions with Graduate Certificates	Credits		Courses
Indiana Wesleyan University	18	→	6
Jefferson College of Health Sciences	18	→	5
Washington University in St. Louis	15	→	5
Montana State University	12	→	4-6

Institutions with Master's-Level Programs	Science Credits	Education Credits	→	Science Courses	Education Courses
University of Illinois at Urbana-Champaign	18	15	→	18	15
University of Illinois at Urbana-Champaign	20	12	→	18	15

Capstone Requirements

Emphasize Biology Content, Rather than Teaching Skills and Capstone Requirements, to Align with Competitors

Develop a graduate certificate with biology content-based course offerings that do not include capstone requirements. Profiled graduate-level biology certificate programs do not require students to complete capstone courses. Capstone requirements differentiate certificate-level programs for educators from master's-level programs and certification programs. Capstone experiences at profiled institutions generally focus on the development of teaching skills. However, graduate certificate courses provide educators with enhanced content knowledge, rather than teaching skills. For example, while certificate courses at **Indiana Wesleyan University** include material on best practices in student learning and teaching, the program does not incorporate a teaching-based capstone experience. Biology content courses within graduate certificate programs include material on a broad range of topics, such as genetics and biological chemistry, and do not generally provide foundational information for future courses in the program. Therefore, program administrators report that personal student preference entirely dictates the coursework that a student may find appealing.

Graduate Certificate- and Master's-Level Program for Science Educators **Capstone, Final Project, and Practicum Requirements**

No profiled institutions require students to submit GRE scores for admission.

Profiled Institutions



Master's-Level and Teaching Licensure Programs



Certificate Programs for Educators

Require Capstone, Final Project, or Practicum

- Boston University
- Drexel University
- Mississippi State University
- Oregon State University
- University of Illinois at Urbana-Champaign
- University of Nebraska

Require Capstone, Final Project, or Practicum

- Washington University in St. Louis

Do Not Require Capstone, Final Project, or Practicum

- Indiana Wesleyan University
- Jefferson College of Health Sciences
- Montana State University

Enrollment

Design a Non-Cohort Based Program with Courses Offered Predominantly in the Summer and Spring

Offer graduate biology certificate courses predominantly in the summer and spring to tailor the program to the schedules of working teachers. Program administrators observe highest enrollment during summer courses outside of the K-12 school year. During the academic year, teachers enroll in spring courses at a higher rate than fall courses because fall courses coincide with the busiest time of the year. Non-cohort enrollment also provides students with additional flexibility to take courses around personal schedules. While cohort students must follow a strict course schedule, non-cohort students receive more autonomy to select most convenient courses.

Students within the **Montana State University** graduate certificate in science teaching programs prefer summer courses that allow educators to complete coursework outside of the academic year. During the summer, administrators offer shortened courses (e.g., six- to 10-week courses) so teachers may also commit to other summer plans. As teachers prepare for the new school year, they enroll in fewer fall semester classes at the University. To account for teacher schedules, administrators at the University offer short courses (e.g., six- to 13-week courses) during the fall that begin after the start of the public school academic year. Similarly, at the **University of Nebraska**, applications distribute evenly over the three annual admission cycles, but students predominantly register for summer courses.

Graduate Certificate- and Master's-Level Degree for Science Educators Program **Enrollments**

Profiled Institutions

Institution	Level	Current Enrollment	Cohort Enrollment
Indiana Wesleyan University	Master's Certificate	3	✓
Oregon State University	Master's	14	✓
University of Nebraska	Master's	30	x
University of Illinois at Urbana-Champaign	Master's	30	x
Montana State University	Graduate certificate	75	x

4) Marketing Messages and Strategies

National Completions

Advertise the Program Heavily despite Low Competition due to Decreasing Program Completions

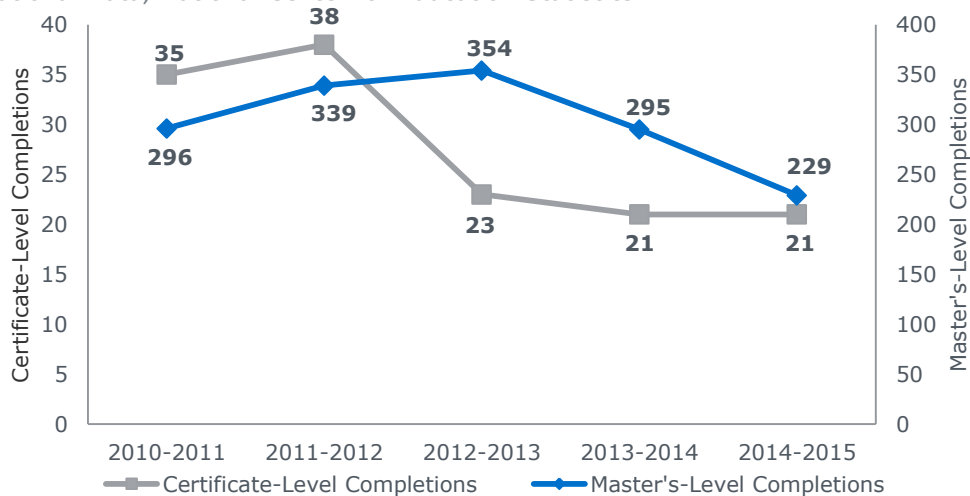
Develop an online graduate certificate in biology for educators to introduce a rare program offering to the state and national market. With only 20 competitor programs nationwide reporting program completions from 2014-2015, **North Carolina State University** can expect low competition. Emphasize that the **University of North Carolina** system does not offer similar programs. Furthermore, no North Carolina institutions report program completions from the 2011-2012 to the 2014-2015 academic year for biology teacher education certificate or master's-level programs³.

However, despite low competition a new program may struggle to attract students. From the 2010-2011 academic year to the 2014-2015 academic year, the number of biology teacher education certificate program completions decreased 40 percent; meanwhile, master's-level program completions fell 30 percent. Additionally, the National Center for Education Statistics reports consistently increasing undergraduate degree conferrals between 1970 and 2012 in all subjects except education⁴. A smaller number of undergraduate teacher education degree-holders likely diminishes the applicant pool for graduate-level programs intended for certified teachers.

Education programs' declining completions and enrollment often occur due to larger challenges facing educators (e.g., low compensation, underappreciated work)⁵. Advertise the high Bureau of Labor Statistics projected employment growth for the "biological science teachers, postsecondary" occupation to persuade students to enroll. Position the program as a means for master's-level educators interested in teaching at the community college level to secure requisite graduate subject matter credit qualifications. The BLS projects a 16 percent employment growth from 2014 to 2024 for "biological science teachers, postsecondary." The estimate greatly exceeds the six and a half projected employment growth for all occupations during that time. Furthermore, the BLS projects six percent employment growth for the "secondary school teachers, except special and career/technical education" occupation from 2014 to 2024, equal to the projected growth for all occupations.

Historical National Completions for Biology Teacher Education Programs

National Data, National Center for Education Statistics⁶



3) [National Center for Education Statistics](#)

4) [The Oswegonian](#)

5) [Combat Declining Education Enrollment](#)

6) [National Center for Education Statistics](#)

Advertise the Graduate Biology Certificate on Social Media to Recruit Prospective Students

To grow program enrollment, administrators at **North Carolina State University** should ensure the department maintains a strong online presence through social media. Students interested in continuing education programs predominantly research opportunities online and often limit research to the internet⁷. Furthermore, EAB research indicates that social media campaigns allow institutions to build prospective student awareness inexpensively⁸. Prioritize social media marketing through Facebook, Twitter, Instagram, and YouTube to improve online outreach to prospective students.

Social media campaigns will differentiate **North Carolina State University** from competitor programs. Administrators at profiled institutions report a lack of targeted marketing campaigns and plan to develop new marketing strategies in the near future. Similarly, contacts at **Oregon State University** observe fluctuations in program enrollment due to inconsistent outreach to undergraduate students at the University and community colleges from year to year.

Marketing Strategies at Profiled Programs

Profiled Institutions and Previous EAB Research



Search Engine Optimization

Search engine optimization allows administrators at **Indiana Wesleyan University** to advertise the program to prospective students who conduct continuing education research online.



Website

Administrators at **Indiana Wesleyan University** rely primarily on the program website to inform prospective students about the program. Similarly, the **University of Illinois at Urbana-Champaign's** program website provides detailed information and an FAQ section.



Word-of-mouth

Administrators at the **University of Illinois at Urbana-Champaign** note that satisfied students refer colleagues to the program. If a teacher enjoys the program, then two to three additional teachers from the same school district will often enroll.



Brochures

When administrators at the **University of Illinois at Urbana-Champaign** first launched the online program, they disseminated brochures to acquaint prospective students in local school districts with the program.



Social Media

[EAB research](#) identifies social media features, such as student social media testimonials and lives news streams, as an effective means to attract prospective students into continuing and online education programs.

Ensure Fast Response Rates to Prospective Student Inquiries to Convert Prospective Students to Applicants

Aim for a 24-hour response rate to teachers who reach out to program administrators about the graduate biology certificate. EAB research identified that prospective

7) [Marketing Across the Program Life Cycle](#)
8) [Disciplining Social Media Strategy](#)

graduate students rate “responsiveness to inquiries” as the second most important source of program information, preceded only by the program website⁹. At the **University of Illinois at Urbana-Champaign** contacts report rapid enrollment growth. While the program currently enrolls 30 students, only 10 students enrolled in the program several years ago. Contacts attribute the growth in enrollment to increased program name recognition and faster response rates to prospective student inquiries. Both instructors and administrative staff within the department now respond to prospective students within 24 hours.

Tuition

Focus Marketing on In-State Student Recruitment to Secure Program Enrollments

Focus marketing efforts on in-state teachers to recruit students most able to afford tuition at **North Carolina State University**. Administrators at public institutions attribute low out-of-state enrollment to higher out-of-state than in-state tuition rates. At the **University of Nebraska**, in-state students constitute the majority of enrollments, though administrators aim to enroll 25 percent of students from out-of-state. Similarly, out-of-state students accounted for 25 percent of enrollment in the **Montana State University** graduate certificate in science teaching programs prior to an increase in tuition for out-of-state students.

Equivalent tuition for in-state and out-of-state students allows administrators at the **University of Illinois at Urbana-Champaign** to more easily recruit out-of-state students. At the **University of Illinois at Urbana-Champaign**, in-state students composed almost all initial program enrollments approximately eight years ago. Currently, out-of-state (e.g., Pennsylvania, Ohio, California) students compose half of the program enrollment.

Graduate Certificate- and Master’s-Level Degree for Science Educators Program Tuition

Profiled Institutions

Institution	Advertised Tuition per Credit
Montana State University	In-state: \$266.50 Out-of-state: \$359.80
University of Nebraska	In-state: \$325.50 Out-of-state: \$609
Oregon State University	In-state: \$450 Out-of-state: \$776
Mississippi State University	\$426.25
Indiana Wesleyan University	\$457
University of Illinois at Urbana-Champaign	\$459
Washington University in St. Louis	\$695*
Boston University	\$768
Jefferson College of Health Sciences	\$775
Drexel University	In-person: \$1,192 Online: \$894

*The University offers discounts to practicing teachers and assesses final cost based on potential participation in other programs.

9) [4 tips for getting inside the mind of a prospective grad student](#)

5) Student Characteristics

Student Characteristics

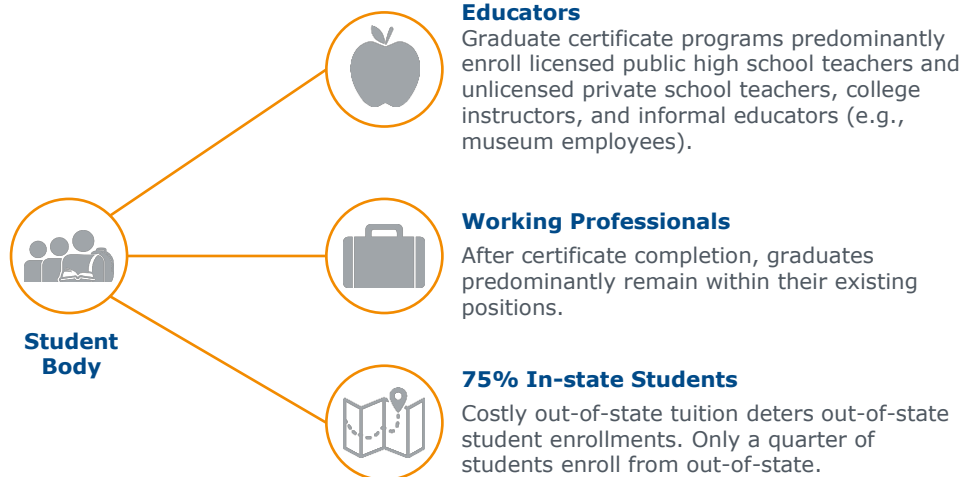
Design the Graduate Biology Certificate for High School and Community College Educators

Tailor the certificate program to the needs of high school teachers to create an offering most relevant to the student market. Though administrators at the **University of Nebraska** intended the Master of Applied Science program with a science for educators specialization to appeal to all K-12 teachers, the program predominantly enrolls high school teachers. Similarly, contacts at **Montana State University** observe that while elementary teachers enroll in the elementary school science certificate program, more specialized certificates, such as those in earth science and chemistry, appeal to high school educators. At Montana State University, high school educators compose about 70 percent of enrollments within science teaching certificate programs.

Also advertise the certificate program to community college educators who seek to enhance their content knowledge. In addition to high school teachers, the **University of Nebraska** program attracts extension and community college instructors who require a master’s-level degree and 18 credits of graduate biology coursework to teach at the community college level. At **Montana State University**, community college educators, who generally already hold master’s-level degrees in science or teaching, enroll in the certificate programs to satisfy employer requirements to maintain their credentials. Community college educators account for about 30 percent of enrollments within Montana State University’s science teaching certificate programs. The 18-credit graduate biology certificate at **Indiana Wesleyan University** within the Master of Education program also prepares students to teach Advanced Placement and community college classes.

Sample Student Characteristics within Graduate Certificate in Science Teaching Programs

Montana State University



Student Motivations and Outcomes

Allow Non-Certificate Seeking Students to Enroll in Graduate Biology Certificate Courses

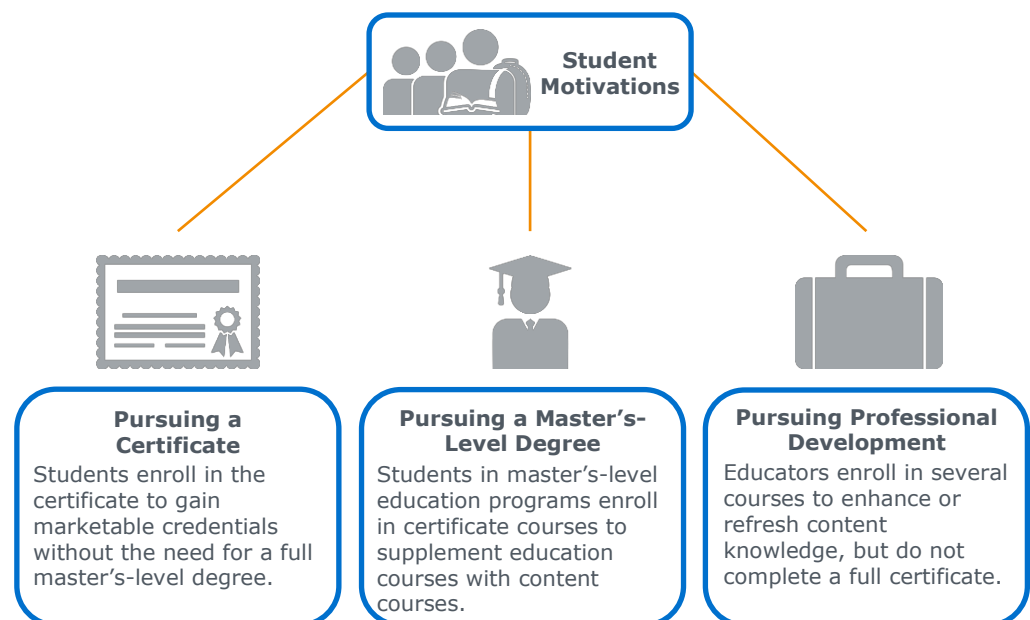
Open program enrollment to certificate-seeking, degree-seeking, and non-degree seeking students to grow the program. At **Montana State University**, students enrolled in certificate courses may use the credits for the certificate, a master's-level degree, or professional development. Similarly, administrators at profiled institutions, such as **Indiana Wesleyan University** and the **University of Illinois at Urbana-Champaign**, allow non-degree seeking students to enroll in graduate coursework.

Advertise the graduate biology certificate program as a means for current educators to enhance content knowledge without pursuing an expensive master's-level degree. After program completion, students in profiled certificate- and master's-level programs for educators typically remain in their current positions and may not receive salary increases. Administrators at profiled institutions, such as **Oregon State University**, note that some teachers enroll in a master's-level program to secure a salary raise. However, contacts at **Indiana Wesleyan University** observe that many school districts no longer increase salaries for teachers with master's-level degrees. The [North Carolina State Board of Education](#) advertises federal loan forgiveness programs for employed teachers, but does not provide information on state-specific tuition reimbursements for graduate studies.

Furthermore, many states and school districts no longer fund teachers to enroll in teacher education programs. Contacts at Indiana Wesleyan University note that enrollment in statewide science educator master's-level programs decreased once the state eliminated tuition assistance. Previously, Indiana funded scholarships for STEM educators to earn graduate degrees; the tuition assistance encouraged educators to apply to master's-level programs. Administrators at the **University of Illinois at Urbana-Champaign** also observe that most school districts no longer help fund teacher education. Market the certificate program as a more affordable option than a master's-level degree for educators to strengthen their credentials.

Sample Student Motivations to Enroll in Graduate Biology Certificate-Level Courses

Montana State University



Appendix: Networking Contacts

Indiana Wesleyan University

Dr. Reuben A. Rubio II
Director of Graduate Programs
765-677-5812
Reuben.rubio@indwes.edu

Montana State University

Kelly Boyce
Program Manager
406-994-6812
Kboyce@montana.edu

Oregon State University

Nick Cabot
Coordinator of the Master of Science in Education
541-737-8564
cabotn@oregonstate.edu

Temple University

Dr. Janelle M. Bailey
Program Coordinator, Master of Education in Secondary Education
702-513-8763
Janelle.bailey@temple.edu

University of Illinois at Urbana-Champaign

Dr. Marianne Alleyne
Graduate Director for the Master of Science Teaching Biology
217-377-0091
vanlaarh@illinois.edu

University of Nebraska

Dr. David Gosselin
Environmental Studies Director
402-472-8919
dgosselin2@unl.edu

Dr. Gerald LeBlanc
Department Head Biological Sciences
gerald_leblanc@ncsu.edu
February 13, 2017

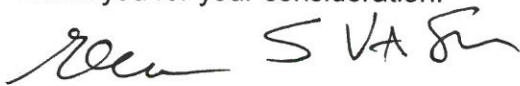
Dear Dr. LeBlanc,

This letter is to express our support of the online graduate certificate in Biological Sciences for Teachers that is being proposed by the Department of Biological Sciences. On January 23, 2017, we had the pleasure of meeting with colleagues from the Department of Biological Sciences who are working to develop the certificate. In attendance were Dr. Jane Lubischer, Professor and Assistant Department Head, Tim Petty, Professor and former Distance Education Coordinator, Dr. Elizabeth Thompson, Lecturer. We discussed the plans for the certificate, which incorporates online graduate courses in biological sciences designed for in-service teachers and other educators.

We see this certificate as a wonderful opportunity for collaboration between the College of Sciences and the College of Education. The proposed certificate courses could be completed in conjunction with many of our programs, including, the STEM Master of Arts in Teaching, the STEM Master of Education, and PhD. In addition, the courses created for the certificate program would meet a critical need for our students who must take classes in the sciences to complete their degrees including the Elementary Education Science Specialist Master's of Education. Two examples of this, are the STEM M.Ed., which requires 18 or more graduate credit hours in biology, and the STEM PhD, which requires 12 graduate credit hours in the sciences. We see the creation of this certificate and its constituent courses as a great opportunity not only for our current students, but also for building the success and recognition of our programs. As we look to build the reputation of our M.Ed. program nationally, we need to be able to offer an increased selection of excellent science courses to our teachers. We also expect the proposed certificate to be of interest to in-service teachers who are not currently pursuing a graduate degree.

Moving forward, we anticipate working closely with our colleagues in the Department of Biological Sciences as they create new online graduate courses in biological sciences specifically for teachers. We enthusiastically endorse the proposed Graduate Certificate in Biology for Teachers, and look forward to the approval of this new program.

Thank you for your consideration.



Sincerely,

Dr. Ellen Vasu
Associate Dean, College of Education

May 16, 2017

Dr. Rebecca Swanson
Associate Vice Provost, DELTA
NC State University
Campus Box 7113
Raleigh, NC 27695

Dear Dr. Swanson:

I am writing this letter to express my support for the newly proposed Online Graduate Certificate in Biological Sciences for Teachers. The certificate program created and proposed by Drs. Elizabeth Thompson, Jane Lubischer and Tim Petty will provide an opportunity for cross collaboration between ourselves and our colleagues in the College of Education. Both the College of Education and the Department of Biological Sciences are supportive of this new initiative. Members of both faculty are excited and prepared to work in collaboration as we move forward in developing and offering new courses for this curriculum.

We are optimistic that the program will be successful based on the results obtained from our feasibility study performed by the Education Advisory Board. The board concluded that there are not many programs such as this in existence, particularly in the Mid-Atlantic region. I have confidence that under the leadership of Elizabeth, Jane and Tim, who will be implementing the recommendations of the Education Advisory Board, and with some additional resources from DELTA, we will have a successful launch in Summer of 2018.

Thank you for consideration.

Sincerely,



William L. Ditto
Dean
College of Sciences

The logo for North Carolina State University, featuring the text "NC STATE" in white, bold, sans-serif font on a red rectangular background.

Jamie Vrabel Barber <jdvrabel@ncsu.edu>

Letter of Endorsement

Elizabeth Ellen Thompson <eethomp2@ncsu.edu>
To: Jamie Vrabel Barber <jdvrabel@ncsu.edu>

Wed, Aug 23, 2017 at 11:32 AM

Hi Jamie,

Thank you to you and Dean Ditto for helping us with our letter of support. We received the DELTA grant to develop our online graduate certificate in biology for teachers. Thanks again!

Elizabeth

Elizabeth EA Thompson, PhD
Lecturer
Environmental and Molecular Toxicology Program
Department of Biological Sciences
North Carolina State University
Raleigh, NC 27695

[Quoted text hidden]

ABGS Reviewer Comments: Graduate Certificate in Biology for Teachers

Reviewer #1:

Following are comments. I concede this isn't my certificate / field / department (although I do have a degree in biology, as it happens). It's just I want us all to challenge each other to aim for quality graduate programs.

- I'm enthusiastic about training K-12 teachers who are knowledgeable about biology and can teach it effectively
- I'm disquieted about how well the proposed certificate accomplishes either
 - The admissions requirements are "a college degree". That is a really, really low bar for a graduate certificate. Suppose they have no qualifications in either education or biology but are admitted and take 4 courses. Are they then knowledgeable about biology and ready to teach it effectively? They will have had 3 biology courses and a course 580 on learning - very shallow preparation.
 - It's very surprising for me to see you could get this credential in biology and not have to take a course in genetics (defined broadly, including DNA and evolution), the basis for all life.

A "fix" for the first is to change the admissions requirements. The catalog description says " will provide additional training in biological sciences to K-12 teachers and other educators", implying they have degrees in education with some background in biology. That would be a much more reassuring admissions requirement.

A "fix" for the second is to at least offer (even better: require) a course in genetics as part of the certificate, with a previous undergraduate course in genetics accepted as fulfilling the requirement.

Reviewer #2:

I also had 2 primary comments. The admissions requirements seem very weak and don't even list all the minimum requirements for grad certificate programs. I think it would be a useful part of the proposal to include what application materials they will evaluate when making admissions decisions.

My second comment may just be due to my lack of knowledge in this area, but the language in the proposal always refers to K-12. It would seem to me that what's needed for someone teaching say elementary school biology might be different than someone teaching high school/community college biology? Not sure how the coursework would address both groups adequately? It wasn't clear to me if the purpose of the certificate is to provide K-12 educators additional credentials to teach at a higher level (AP/Community College) or enhance their teaching at their current grade level? Just some more clarification might be useful.

Reviewer #3:

I agree with all of this and the point about this being very widely defined for K-12? It would seem that the requirements would be widely different? Should different courses be recommended for different grade levels?

Thank you for the thoughtful reviews of our proposed certificate program. Input on the admissions requirements is most helpful. We have rewritten our admissions requirements accordingly:

Admissions Requirements

Applicants must meet one of these three requirements:

- have earned a bachelor's degree from an accredited college or university with minimum 3.0 GPA in the last 60 credit hours of undergraduate study
- be a graduate student in good standing in an education-related masters or doctoral program
- have earned a master's degree from an accredited college or university

To better clarify the target population, we have changed the language to indicate:

“pre-college teachers (grades 6-12), community college instructors, and informal educators (e.g., museums, zoos, national parks)”

In addition, it is important to note that our certificate courses focus on biological concepts and scientific competencies, not on pedagogy. Our courses will sometimes include assignments that challenge certificate students to generate teaching activities and assessments to teach a biological concept, but we are not designing courses to teach these educators how to teach. This decision is based on 1) our conversations with faculty colleagues in the College of Education and with our faculty expertise and 2) as recommended by the feasibility study performed by DELTA, whereby researchers suggested we “emphasize biology content to align with competitors”. We believe our decision to focus primarily on biology content is clear in our program outcomes.

When planning our course requirements, we did consider having more required courses, perhaps to force students to sample across the biological sciences. However, biology is such a diverse field that it is impossible to cover all aspects of the discipline in 12 or even 18 credit hours without doing so in a superficial manner. In addition, our colleagues in education expressed interest in an approach that would allow certificate students to choose the areas of biology that they wanted to pursue. We are committed to continuing to develop courses to offer an increasingly diverse list of electives, and this includes a commitment from one of our genetics faculty members to develop a genetics course for our online certificate students. For our one required course, we decided the neurobiology of learning would be the one topic that would benefit all of these educators. In addition, having one required course as a final course will better enable our assessment efforts.

Thank you again for your thoughtful and collegial comments. I look forward to discussing this in person at the Administrative Board meeting on the 30th.

Elizabeth Thompson and Jane Lubischer

In response to discussions at the Administrative Board on 30 November 2017, we have revised our proposal in several ways, as described below.

Name and CIP code

We have changed the name to **Biology for Educators** (rather than Biology for Teachers), to more accurately reflect that the primary target audience is educators working in a variety of settings and not only those teaching in a classroom. CIP code concerns have been resolved by **using a biology CIP code (26.0101)**, which is more appropriate for the proposed program.

Outcomes alignment

By allowing students the freedom to choose courses on topics that are of greatest interest and/or of greatest use to them, we force ourselves to write outcomes that are not specific in content. We addressed this challenge in part by identifying one biological topic (the neurobiology of learning) that we believe should be of interest to all educators. We built into the program a capstone course that focuses on the neurobiology of learning and allows students the opportunity to integrate what they learn in this course with their own experience and expertise (primarily, we expect, in education and science communication).

Originally, some assignments in this capstone course asked students to draw on their expertise to create learning activities and through doing so demonstrate their understanding of key biological concepts drawn from the courses they have taken for the certificate. In this course and in other proposed courses, we thought it would be an advantage to certificate students to be able to develop products that they could then take and use in their own work. However, we now understand that these assignments might be seen as assessing pedagogy rather than scientific knowledge. Accordingly, we will modify these assignments in all proposed courses to make clear that the intent is not to assess skills related to planning learning activities, but to focus instead on the biological content. **We have had all BSC 5** courses rolled back in CIM and will work with our faculty to modify assessments before resubmitting them for review.** One course (BSC 527) was designed to combine elements of biology, illustration, and pedagogy – **BSC 527 has been removed** from our list of proposed courses and it has been deleted from CIM.

In addition, **we have modified our program outcomes and will modify assignments in BSC 580** that are used to collect direct evidence in support of program assessment. We did not intend to focus on teacher preparation, other than to the extent that an enhanced knowledge base is of service to those who are educators. We believe these changes strengthen the proposed certificate program and clarify its purpose.

Admissions

To gain a sense of student motivation, **we have added a requirement that applicants submit a one-page statement** describing how this certificate program will benefit their personal or professional development and career goals.

We believe that a student who meets our admissions requirements and is motivated to learn the material will have every opportunity to be successful in these courses. One might compare our requirements to the admissions requirements for the NC State Master of Physiology, which is a non-thesis masters degree. That program does not require any specific coursework or specific major – indeed, it encourages students to apply even if they have undergraduate degrees outside of the sciences. Similarly, the online Applied Statistics and Data Management certificate at NC State also does not require specific undergraduate coursework in its minimum requirements.

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