From:	Smith, Randy
To:	Newman, Leslie
Cc:	Sutherland, Sue; Smith, Randy; Griffiths, Rob; Reed, Katie; Duffy, Lisa; Hunt, Ryan; Kwiek, Nicole; Kroetz, Deanna
Subject:	Proposal to establish a Drug Discovery Certificate
Date:	Friday, June 12, 2026 3:02:15 PM
Attachments:	image001.png

Leslie:

The proposal from the College of Pharmacy to establish a Drug Discovery Certificate (categories 1a and 2) was approved by the Council on Academic Affairs at its meeting on June 11, 2026. Thank you for attending the meeting to respond to questions/comments.

No additional level of internal review/approval is necessary. This action will be included in the Council's next Annual Activities Report to the University Senate (July 2026).

The Office of the University Registrar will work with you on any implementation issues.

Please keep a copy of this message for your file on the proposal and I will do the same for the file in the Office of Academic Affairs.

If you have any questions please contact the Chair of the Council, Professor Sue Sutherland (.43), or me.

I wish you success with this important program development.

Randy

THE OHIO STATE UNIVERSITY

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
University Square South, 15 E. 15th Avenue, Columbus, OH 43201
614-292-5881 Office
smith.70@osu.edu
Assisted by:
Katie Reed
Executive Assistant
(614) 292-5672

From: Kwiek, Nicole
To: Smith, Randy; Reed, Katie
Cc: Newman, Leslie; Kroetz, Deanna
Subject: Proposal to Establish a Drug Discovery Certificate
Date: Tuesday, March 31, 2026 7:58:24 PM
Attachments: image001.png
Cover Letter to CAA_Drug Discovery Certificate.pdf
Drug Discovery Certificate Proposal (March 2026).pdf
Letter of Support_DD Certificate_Dean.pdf

Dear Randy,
Please find attached a set of proposal documents for a new academic certificate in Drug Discovery within the College of Pharmacy.

If you have any questions whatsoever as CAA undergoes its review, please don't hesitate to reach out to me or Dr. Newman.

Thank you in advance for the committee's review efforts!

Best,
Nicole

Cc: Dean Kroetz, Leslie Newman

THE OHIO STATE UNIVERSITY

Nicole Cartwright Kwiek, PhD, FAAPE
Senior Associate Dean for Academic Affairs and Educational Innovation
Clinical Professor of Pharmacy Education and Innovation
College of Pharmacy

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Pronouns: she/her/hers

THE OHIO STATE UNIVERSITY

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March 31, 2026

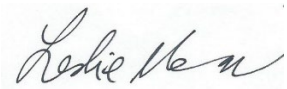
Vice Provost W. Randy Smith
Council on Academic Affairs
Office of Academic Affairs
University Square South
15 E. 15th Ave.
Columbus, OH 43201

Dear Dr. Smith,
The College of Pharmacy is seeking approval for a **Drug Discovery Certificate Program (Category 1a and 2)** designed to equip students with specialized knowledge in the rapidly evolving field of pharmaceutical sciences research. The proposed certificate would consist of a curated set of courses, including foundational topics in pharmacology, medicinal chemistry, and pharmaceutics, and would culminate in a capstone experience with interdisciplinary teams working on mock studies from external industry partners and/or in-house research labs.

This certificate would be particularly beneficial for science majors pursuing careers in the pharmaceutical industry but uniquely, will also include a pathway for non-science majors. Offering drug discovery education to non-science majors is a novel educational shift that bridges the gap between technical research and the essential business and regulatory functions of the pharmaceutical industry. By offering flexible prerequisites and elective options tailored to different backgrounds, the Drug Discovery Certificate would promote cross-disciplinary enrollment, enriching classroom discussions and preparing all participants for collaborative environments in the pharmaceutical industry.

The pharmaceutical and biotechnology sectors continue to experience unprecedented growth, with significant workforce demands in early-stage drug development. Students pursuing careers in academia, industry, or regulatory science increasingly require foundational competencies and skills that are not comprehensively addressed in existing supplemental programs. I am confident that implementing this Drug Discovery Certificate will align with our mission to contribute to the education of well-rounded professionals ready to address global health challenges.

Sincerely,



Leslie Newman, PhD
Assistant Dean of Undergraduate Studies, College of Pharmacy

cc: Nicole Kwiek, Deanna Kroetz

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March 4, 2026

Vice Provost W. Randy Smith
Council on Academic Affairs
Office of Academic Affairs
University Square South
15 E. 15th Ave.
Columbus, OH 43201

Re: Letter of Support – Proposed Drug Discovery Certificate

Dear Dr. Smith,

I am writing to express my enthusiastic support for the proposed Drug Discovery Certificate. This new credential represents a timely, strategically important, and enriching opportunity for students wanting to enhance their knowledge of drug discovery or for those desiring to work in the pharmaceutical industry. Our college has a distinguished record in pharmaceutical sciences research and teaching, with active faculty engaged in medicinal chemistry, computational drug design, pharmacology, and drug delivery systems. This expertise is reflected in the certificate's coursework.

The college is prepared to support this initiative through assigned faculty teaching effort, laboratory resources, and administrative infrastructure as described in the proposal. We are also actively cultivating industry partnerships that will provide mock studies, internship placements, and/or capstone experience preceptors. Two regional biopharmaceutical companies have already indicated informal interest in partnering in this work.

In summary, the Drug Discovery Certificate is a thoughtful response to workforce needs and reflective of the College of Pharmacy's commitment to preparing the next generation of pharmaceutical scientists. I offer my full support for its approval and look forward to its successful implementation.

Sincerely,

Deanna L. Kroetz

Deanna Kroetz, PhD, BS Pharm
Dean and Professor, College of Pharmacy

Proposal to Establish an Undergraduate Academic Certificate in Drug Discovery

The Ohio State University College of Pharmacy

Introduction

The College of Pharmacy proposes the launch of a new undergraduate academic certificate in Drug Discovery (Category 1a and Category 2) to be offered to undergraduates and post-baccalaureate students. This certificate is designed to provide students with specialized knowledge and problem-solving skills in the multifaceted process of identifying, developing, and testing new drugs to treat or prevent diseases. This certificate program will equip students with foundational expertise in areas such as drug target identification, lead optimization, and preclinical testing, bridging theoretical coursework with practical applications in drug discovery.

Aimed at individuals interested in pursuing careers in the pharmaceutical or biotech industry, our drug discovery certificate includes options to help both science and non-science majors build the appropriate foundational knowledge and skills in drug discovery. The certificate will comprise 15 credit hours including targeted coursework, electives, and a collaborative problem-solving capstone project. By fostering collaboration between science and nonscience majors, this certificate will not only promote understanding of the complexities of drug discovery but will also strengthen communication and collaboration skills between distinct disciplines.

Background and Rationale

The pharmaceutical industry is experiencing robust growth, driven by advancements in technology, increasing global health needs, and the integration of artificial intelligence (AI) in research processes. Total US prescription drug sales revenue reached $716 billion[1] in 2022 with the industry employing over 341,000 professionals[2]. In this context, there is a growing demand for skilled drug discovery professionals, and an undergraduate Drug Discovery certificate will help increase student interest in this field. Students majoring in chemistry, biology, neuroscience, and related disciplines would gain foundational knowledge of the scientific, technical, and problem-solving skills critical to pharmaceutical sciences. Developing this advanced knowledge early gives students a significant headstart in building a successful career in the field.

Additionally, nonscience majors (e.g. business, pre-law, and marketing), who may be interested in working in the pharmaceutical industry, can pursue this certificate as well. This certificate would not only equip nonscience majors with foundational knowledge on drug discovery but will also provide them with scientific literacy that can enhance their effectiveness in business, regulatory, communications, or administrative positions within the pharmaceutical sector. Others have demonstrated initiatives to introduce drug discovery to nonscience undergraduates through coursework and various projects. Empirical studies show that these educational interventions can effectively enhance scientific literacy among non-STEM majors[3,4]. Since careers throughout the pharmaceutical industry benefit from understanding the drug discovery process, even at a general level, education in drug discovery would enable both

science and nonscience professionals to collaborate more effectively. In short, while scientists drive the technical side of discovery, nonscientists help ensure that promising drugs can be funded, approved, produced, marketed, and delivered to patients. Familiarity with the discovery process gives nonscientists credibility, context, and the ability to collaborate effectively with their science colleagues.

Existing programs in drug discovery

Most formal certificate programs in drug discovery are offered online and targeted towards graduates/professionals, including University of California San Diego's Professional Certificate in Drug Discovery and Development, Drexel University's Certificate in Drug Discovery and Development, and Stanford University's Graduate Certificate in Drug Development: From Discovery to Commercialization. The University of North Texas Health Science Center's Online Graduate Certificate in Drug Discovery and Development includes an option for undergraduate seniors alongside graduate and working professionals, but standalone drug discovery certificates specifically for undergraduates are relatively uncommon. Additionally, most of the aforementioned programs require students to have a bachelor's degree in a science-related field or to be in an existing science-focused major.

Opportunities to focus on drug discovery as an undergraduate in Ohio are scarce except for the University of Toledo's Bachelor of Science in Pharmaceutical Sciences (BSPS) program with a major in Drug Discovery and Design. We are well-positioned to leverage our own robust BSPS coursework to offer a drug discovery certificate at the undergraduate level, catering to both science and nonscience majors. This certificate would fill a gap by allowing earlier exposure to this field, enabling students to gain competitive advantages in internships and job placements within the biopharma industry.

Overall, the rationale for implementing this certificate within our pharmaceutical sciences program is multifaceted. First, it gives students university-wide the ability to learn about the drug discovery process. Second, it can evolve with industry trends to deliver up-to-date information such as new AI-based approaches in drug discovery processes. Third, by incorporating experiential elements like laboratory simulations and real-world problem-solving, the certificate could boost employability. Ultimately, this certificate will promote the field of drug discovery to science and nonscience majors outside of the College of Pharmacy and serve as an initial step in preparing graduates for careers in the growing pharmaceutical/biotech industry.

Program Objectives

Upon successful completion of the Drug Discovery Certificate, students will be able to:

- Explain the core principles of drug discovery
- Critically evaluate primary scientific literature in drug discovery
- Demonstrate familiarity with emerging technologies in drug discovery
- Work effectively in interdisciplinary teams to address problems related to drug discovery

- Communicate pharmaceutical science principles and data clearly and effectively for both scientific and general audiences

Proposed Coursework

Required core courses: (9-10 credits)

- **PHR 2530**: **Introduction to Pharmaceutical Science Research (2 credit hours)**
    - Designed to differentiate investigation-focused pharmaceutical research compared to skills-focused laboratory course work and introduce students to exciting topics of active research in the field in a highly approachable way

- Choose **ONE** of the following:

  <u>For science majors or others who have taken a biochemistry course</u>
    - **PHR 4000**: **Molecules to Medicine I (5 credit hours)**
        - Principles governing the design, synthesis, delivery, action and use of drugs in disease treatment. Model disease pathophysiology and treatment will be investigated, discussing how biological differences can be targeted for therapeutic gain
        - Prerequisite: PHR 3200 (Biochemistry for the Pharmaceutical Sciences) or BIOCHEM 4511 (Introduction to Biological Chemistry) or BIOCHEM 5613 (Biochemistry and Molecular Biology I)

  <u>For students who do not have a science background or have not taken biochemistry</u>
    - **PHR 2500** AND **PHR 2010** (neither have prerequisites)
        - **PHR 2500: Drug Discovery, Development, and Delivery (3 credit hours)**
            - Provides a comprehensive overview of the drug discovery, development, and delivery process within the US healthcare system, exploring the roles of vested stakeholders (e.g., patients, pharmaceutical industry, providers, insurers, society, etc.) during a drug's "bench to bedside" development including its post-development place in therapy
        - **PHR 2010: Pharmacology: How Drugs Work (3 credit hours)**
            - Presents an overview of basic principles underlying drug action

- **PHR4700**: **Pharmaceutical Science Capstone Experience (2 credit hours)**
    - In this course students are challenged to apply design thinking methodologies through collaboration in multidisciplinary teams to address real-world challenges from industry or academic partners. This experience prepares graduates to be adaptive problem-solvers who can navigate complexity, collaborate across interdisciplinary boundaries, and help drive human-centered innovation

- Students with at least 2 semesters of 4998 research credit related to pharmaceutical science research and demonstrating forward progress in a research project may waive this course.

Electives: (5-6 credits) - include options offered online and in-person

- **PHR 3400 - Therapeutic Frontiers (2 credit hours)**
- **PHR 3430S - Quest for the Cure (4 credit hours)**
- **PHR 3440 - Drugs that Changed the World (3 credit hours)**
- **PHR 4180H - Drug Discovery in the Central Nervous System (2 credit hours)**
- **PHR 4210H - Problem Solving in Biomed Chem (2 credit hours)**
  - Prereq: PHR 3200 (Biochemistry for the Pharmaceutical Sciences)
- **PHR 4330 - Basic Pharmacokinetics (2 credit hours)**
  - Prereq: Math 1150 (Precalculus)
- **PHR 4402 - Economic Evaluation of Healthcare and Pharmaceutical Interventions (3 credit hours)**
- **PHR 4420 - Biologics: Transforming Medicine (2 credit hours)**
  - Coreq: PHR 3200 (Biochemistry for the Pharmaceutical Sciences)
- **PHR 4430 - GPCR Pharmacology (2 credit hours)**
  - Coreq: PHR 3200 (Biochemistry for the Pharmaceutical Sciences)
- **PHR 4440 – Pharmacology of Neurologic & Psychiatric Disorders (3 credit hours)**
  - Prereq: PHR 3200 (Biochemistry for the Pharmaceutical Sciences) or BIOCHEM 4511 (Introduction to Biological Chemistry) or BIOCHEM 5613 (Biochemistry and Molecular Biology I)
- **PHR 4490 – Survey of AI/ML in Pharmaceutical Sciences (3 credit hours)**
- **PHR 4610 - Experimental Techniques in Drug Discovery (4 credit hours)**
  - Prereq: 3200 (Biochemistry for the Pharmaceutical Sciences) or equivalent
- **PHR 4800 - Advances in Microbial Biotechnology (3 credit hours)**
  - Prereq: MICRBIO 4100; or BIOCHEM 4511 (Introduction to Biological Chemistry) or 5613 (Biochemistry and Molecular Biology I); or Pharmacy 3200 (Biochemistry for the Pharmaceutical Sciences)

Admission and Completion Requirements

Any Ohio State student who is not currently enrolled in our BSPS program is eligible to enroll in this certificate program. Additionally, the program is open to post-baccalaureate students who are not currently enrolled in an academic program at Ohio State. Though it is challenging to forecast student interest, we anticipate 25-35 students will enroll each year; if demand exceeds this projection, we are poised to handle an increase in enrollment.

To formally add the certificate, interested students will complete an online form and then meet with a College of Pharmacy undergraduate advisor to customize their plan.

The Drug Discovery Certificate requires a minimum of 15 credits. Completion of the certificate requires a "C-" or better in all courses and successful capstone presentation. The certificate must be in a different subject than the major, so our college's BSPS students will not be eligible to enroll. No more than 50% of certificate coursework will be able to overlap with courses in a major, minor, other certificate, or the GE curriculum.

Benefits, Implementation, and Resources

This certificate will enhance student resumes, facilitate academic and industry connections through problem-solving collaborations, and support institutional goals of innovation in STEM education. This certificate does not duplicate any other currently offered at Ohio State. With the exception of PHR4700 (Pharmaceutical Sciences Capstone Experience), all courses offered in this certificate are developed and are currently being taught by existing faculty and within our facilities. We are currently planning the PHR4700 course and will work with division chairs to identify teaching effort for these courses in the next 2 years. We do not anticipate any instructional capacity issues with this certificate's launch.

Assessment of Program Success

Success for this certificate will be determined by student performance during pursuit of the certificate as well as by the retention rate of completion. Students successfully completing the certificate will be tracked, with success defined as a retention rate of over 70%. Additionally, student feedback in course surveys, SSLEs, and via the capstone will be used to evaluate the program. The Assistant Dean for Undergraduate Studies and the college's Resource Planning Specialist in Assessment for the College of Pharmacy will monitor data and feedback to support continuous quality improvement.

Process and Timeline

The Undergraduate Studies Committee in the College of Pharmacy reviewed and approved this proposal on November 19, 2025. Pending approval, we would prefer to launch the certificate program in Autumn 2026.

References

1. Parasrampuria S, Murphy S. Comparing U.S. and International Market Size and Average Pricing for Prescription Drugs, 2017-2022: Issue Brief. Washington (DC): Office of the Assistant Secretary for Planning and Evaluation (ASPE); 2024. Available from https://www.ncbi.nlm.nih.gov/books/NBK611829/
2. US Bureau of Labor Statistics, US Department of Labor, Occupational Employment Statistics; 2024. Available from https://www.bls.gov/oes/2023/may/naics4_325400.htm#00-0000
3. Dube DH. Design of a drug discovery course for non-science majors. Biochem Mol Biol Educ. 2018 Jul;46(4):327-335.
4. Fray MJ, Macdonald SJ, Baldwin IR, Barton N, Brown J, Campbell IB, Churcher I, Coe DM, Cooper AW, Craven AP, Fisher G, Inglis GG, Kelly HA, Liddle J, Maxwell AC, Patel VK, Swanson

S, Wellaway N. A practical drug discovery project at the undergraduate level. Drug Discov Today. 2013 Dec;18(23-24):1158-72.