THE OHIO STATE UNIVERSITY

College of Arts and Sciences

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Members of the Arts and Sciences Curriculum Committee:

I am pleased to support the proposal for a Wicked Science certificate program submitted by Professor Mark Moritz of the Department of Anthropology. The proposal has been reviewed and approved by the Anthropology Department's Undergraduate Studies Committee, which I chair.

Committee members believe the proposed certificate program will prepare undergraduates to tackle what are known as "wicked problems" – those that have many interdependent factors and diverse stakeholders. Global challenges, such as climate change, food security, and emerging infectious diseases, are all examples of such wicked problems.

The Undergraduate Studies Committee of the Department of Anthropology believes that the proposed certificate program will equip students with the intellectual skills they need to confront and address the complexity of wicked problems.

Sincerely,

Debbie Guatelli-Steinberg, Ph.D.
Professor and Director of Undergraduate Studies
Department of Anthropology

UNDERGRADUATE CERTIFICATE IN

WICKED SCIENCE

Neither wicked, nor just for scientists

THE OHIO STATE UNIVERSITY

Certificate in Wicked Science

Required Information

- Wicked Science Certificate (WICKSCI-CR)
- Type 1a, Stand-Alone Undergraduate Academic Certificate: Post-High School Diploma
  Type 1b, Embedded Undergraduate Academic Certificate: Post-High School Diploma
  Type 2, Stand-Alone Undergraduate Academic Certificate: Post-Bachelor
- Delivered through in-person classroom instruction of required courses, with optional on-line or hybrid course offerings for some elective courses.
- We would like our program to be approved and implemented by Autumn 2024
- The certificate program is interdisciplinary but will be housed in the Department of Anthropology, the advising board is made up of faculty and students from different departments.
- A student is permitted to overlap up to 50% of credit hours between other degree programs (major, minor, other certificate, or general education) and the certificate program.

Brief description of the purpose, significance, and rationale

The goal of the proposed Wicked Science certificate program is to train undergraduate students to become *wicked scientists* who are able to tackle the grand challenges of today and tomorrow—what are otherwise known as wicked problems. The concept of wicked problem describes a wide range of global challenges including climate change, food security, growing inequality, cyber security, and emerging infectious diseases. Wicked problems have two fundamental properties: (1) they are dynamic, complex systems with many interdependencies; and (2) stakeholders have different values, interests and conceptions of the problem and its solution. Because wicked problems are complex and political, it is impossible to “solve” them.

The standard scientific approach conceptualizes problems as having straightforward technical solutions but ignoring the complexity and political dimensions of such problems has serious consequences. The accident of the Space Shuttle Columbia in 2003, for example, was not simply the result of technical malfunction, but the result of underlying organizational and cultural issues within NASA. In other words, rocket science is not just an engineering problem, but a wicked problem that is highly complex and involves numerous stakeholders. And though much has been written about the challenges of such wicked problems, this has not translated into programs that train scientists to tackle these grand challenges in transdisciplinary research teams.

Because most pressing problems in the world are wicked problems, it is becoming essential for undergraduate students to have the necessary skills to collaborate successfully in diverse teams with different stakeholders. Moreover, students want to make a meaningful difference in the world. For many of them a college education is not just about the economic payoff of getting

a well-paid job, but about learning how to engage with the wicked problems that they are facing. They want to have learning experiences that are meaningful, interdisciplinary, and relevant. Programs that engage with these problems, are open-ended, focus on imagining futures, and develop solutions in addition to critically analyze problems are critical for students who want to shape the future.

The goal of the Wicked Science certificate program is to train students to become wicked scientists – researchers with the skills and attitudes to tackle wicked problems. This entails that students will be able to:

A. Tackle wicked problems using a systems-thinking approach that seriously considers the roles, interests, and perspectives of stakeholders.
B. Collaborate effectively with stakeholders and team members from diverse backgrounds and experiences.
C. Communicate scientific research and ideas to diverse audiences and through different modalities.
D. Meet ethical, collegial, and professional expectations and standards in collaborative research and other professional endeavors.
E. Articulate a sense of purpose and develop competencies, skills, and habits that prepare them for life-long learning about and engaging with wicked problems.

In short, the certificate program will train students from across the university to become wicked scientists who are able to create an inclusive culture in transdisciplinary teams, which is critical for realizing what is known as the diversity bonus—the benefit teams gain from generating new ideas through the diversity of their members. The certificate program will prepare students for a wide range of professional careers and career fields.

Sources of Student Demand for Proposed Certificate

We anticipate that initially the program will attract 10 to 20 students. We will recruit students through our network of wicked buckeyes, which includes students, staff, and faculty from across the university and through social media. We hope that the number of enrolled students stabilizes around 25 to 40 students after the first year. The program is relevant for and open for students from all colleges across the university.

Relationship to Other Programs / Benchmarking

The Undergraduate Wicked Science Program is similar to the Graduate Interdisciplinary Specialization (GIS) in Wicked Science that was approved by the Council on Academic Affairs in the Spring of 2023. The main difference is that the undergraduate certificate programs include an additional elective course.

While there are many interdisciplinary and transdisciplinary programs that train students for careers in particular fields, e.g., childhood education, technology, transportation, health science,

climate, there are few certificate programs that train students to become transdisciplinary researchers ready to engage long-term with wicked problems. One example is the University of Illinois Urbana-Champaign's Wicked Environmental Problems Certificate (https://nres.illinois.edu/academics/certificates/wicked-environmental-problems-certificate). Moreover, most of these programs are aimed at graduate students rather than undergraduates, see for example Arizona State University's School of Sustainability certificate programs (https://schoolofsustainability.asu.edu/degrees-and-programs/certificates/).

The program that is most similar to our wicked science certificate program in that is not tied to a particular field or set of wicked problems is the Knowledge Integration program at the University of Waterloo in Canada. It trains students to become transdisciplinary scholars ready "to understand and solve complex problems, communicate effectively, and make a difference in a complex and changing world" (https://uwaterloo.ca/future-students/programs/knowledge-integration). The main difference with our wicked science program is that this is a major, not a free-standing certificate option that is available to all students across the university. Thus, the wicked science certificate program will be the first of its kind in the United States and offer a unique opportunity for students at Ohio State.

Description of the Proposed Curriculum

The curriculum consists of five courses: four required in-person courses and one elective course for a total of at least 12 credits. None of the required courses have prerequisites. All the required courses are in person, but some of the electives may be hybrid or distance-learning.

Students will be able to complete the certificate in two to four semesters. The required courses are offered at least once a year (and two are offered every semester). The courses can be taken in any order, except for the capstone course – *5515: Careers for Wicked Scientists* – which can only be taken after completion of the other courses or while completing the other courses.

1. **ANTHROP/EEOB 5505: Wicked Science (3 credits) offered every spring (required).** Wicked problems have two fundamental properties: they are complex with many interdependencies; and stakeholders have different values, interests and conceptions of the problem and its solution. Tackling them requires the skills and attitudes of a wicked scientist. This is the idea behind this transdisciplinary course. You will learn what wicked problems are and learn strategies for tackling the politics and complexity of these problems.

2. **EEOB/ANTHROP/ENR/VETPREV 5510: Interdisciplinary Team Science (3 credits) offered every autumn (required).** The goal of this course is to teach students these skills. Students will learn the best practices for building and leading interdisciplinary teams, how to communicate effectively within interdisciplinary teams, recognize and foster the individual qualities necessary to be successful in interdisciplinary teams,

build interdisciplinary teams that are intentionally collaborative, diverse, equitable, and inclusive, and create a collaboration plan for an interdisciplinary team.

3. One of the following courses is required:

    - **PUBAFRS 5620: Rapid Innovation for Public Impact (4 credits) offered every semester.** This is a multi-disciplinary capstone or hands-on applications course in which student teams tackle real, contemporary, complex problems sponsored by government or non-profit agencies. Its goal is to produce solutions that are technically feasible, desirable from stakeholders' perspectives, and viable for adoption and integration. Following a systematic methodology, student teams develop minimum viable products or proofs-of-concept through intensive customer discovery and agile design, development, and testing with customers and stakeholders. Students acquire an in-depth understanding of and experience in systematic innovation, refining problem-statements, engaging customers and stakeholders, navigating public sector organizations, budgeting, and management issues.

    - **DESIGN 5650: Advanced Collaborative Design (3 credits) offered every spring.** At the end of the course successful students should be able, at an advanced level, to acknowledge the complexity of social realities and appraise how socio-contextual variables may affect human behaviors; consider unconventional conceptual categories to foster the development of innovative solution; leverage experience design to develop contextually fitted preventive measures or programs; adopt an abductive logic of reasoning and use iterative ideation and divergent scenarios as a reflective framework; work effectively in collaborative multidisciplinary setting; think broadly about the boundaries of specific design discipline, and develop and propose culturally fitted measures.

4. **One elective course (2 or more credits),** which can be: (1) *a topical course* that focuses on a particular set of wicked problems (e.g., gender inequality, climate change); (2) a *methods course* for studying wicked problems (e.g., systems modeling, community-based research); and/or (3) *a skills-development course* for wicked scientists (e.g., leadership, business management). Below is a list of examples of electives that would count towards the certificate program. Students can petition that other courses can be used as an elective.

5. **ANTHROP 5515: Careers for wicked scientists (1 credit), offered every semester (required).** The goal of this workshop is for students to synthesize what they have learned about wicked science and to demonstrate that they have the competencies of wicked scientists who are able to tackle the grand challenges of today and tomorrow—what are otherwise known as wicked problems. In particular, students will learn how to communicate the concepts and competencies of wicked scientists clearly and compellingly to clients, employers, and organizations in their desired career fields.

Sample program

Most students will complete the wicked science certificate program within two years (or four semesters). The following sample program demonstrates a common pathway to certificate completion.

	Autumn Semester	Spring Semester
Year 1	EEOB 5510 Interdisciplinary Team science	ANTHROP 5505 Wicked Science DESIGN 5650: Advanced Collaborative Design
Year 2	ESHESA 2570: Team and Organizational Leadership	ANTHROP 5515 Careers for wicked scientists

Examples of electives

Here are just a few examples of courses that would count as electives towards the certificate program. This is not an exhaustive list. Students can petition that other courses be counted as electives for the wicked science certificate. The petition consists of a simple email to the faculty lead with a brief explanation of how the course would help students develop wicked competencies and the syllabus attached. When approved, the electives will be added to our list of electives on our program website (https://u.osu.edu/wicked/).

- **ENGLISH 3020: Writing about Sustainability (3 credits) (Prereq: Completion of GE Foundation Writing and Information Literacy course).** As an advanced-level writing course, this course will ask students to engage in critical and logical thinking about sustainability via a variety of written genres. By identifying, describing, and synthesizing a wide range of approaches to defining and practicing sustainability, students will acquire a vocabulary for writing about the ways humans are fundamentally dependent on the Earth and its many environmental systems. They will then build from this vocabulary to describe, analyze, and critique the roles and impacts that human activity and technology have on both human society and the natural world over time.

- **ENGLISH 3304: Business and Professional Writing (3 credits, online or in-person) (Prereq: ENGLISH 1110.01 or equivalent).** Mindful of the ways market logics condition writing practices, cultures, and genres, students will practice strategies and tactics for the following: attuning and responding ethically to business and/or professional rhetorical situations; mobilizing communicating genres common to contemporary business and/or professional situations; and creating inclusive, sustainable, and socially just professional environments.

- **PUBAFRS 2620: Contemporary Issues in Science, Engineering, and Technology Policy (3 credits).** Students will explore the ethical, social, historical, and psychological dimensions of science, engineering, and technology and reflect on their individual values and role as informed citizens. Course content and activities help students develop understanding of diverse perspectives on the role of science, engineering, and technology in citizenship and notions of justice, both globally and in the U.S. In addition to gaining familiarity with core issues, processes, and frameworks in science, engineering, and technology policy and citizenship, students will develop skills in identifying and communicating innovative solutions to a range of policy audiences.

- **DESIGN 4650: Collaborative Design Studio (3 credits).** With equal emphasis on research, creativity, design-build, and public engagement, this studio builds upon knowledge and skill sets from past coursework and amplifies capacities for collective creativity, risk taking, and public participation to enact “design activism” for sustainability. The team-based projects creatively respond to the needs, requests, and aspirations of our community partners.

- **KNOW 2310: Seeing and Making (Studio) (4 credits).** This course introduces students to the role of design thinking in the lived environment. Design thinking stretches from close observation to imaginative and conscientious creation. By developing and practicing design thinking, students discover opportunities and expand their agency to act within the lived environment. The term lived environment celebrates the human relationships with the natural and constructed worlds with all its entanglements. It recognizes continuity and connection between the cultural and the ecological, the built and the found, the visible and invisible.

- **ESHESA 2570: Team and Organizational Leadership (3 credits).** This course provides an overview of the theory related to, and skills necessary for, the practice of effective leadership in team and organizational settings. Leadership is explored as an integral component of a student's career and life plan, focusing on the theory of relational leadership along with the importance of interpersonal skills and group dynamics. At the conclusion of this course, students will demonstrate understanding of leadership theory and research, increased awareness of the personal qualities and skills they bring to leadership settings, and an increased confidence and skill in practicing leadership in the collegiate, workplace and/or community setting.

- **ENR/AEDE 4567: Assessing Sustainability: Project Experience (3 credits) Prereq: AEDE 2500 or ENR 2500, and Sr standing; or permission of instructor).** The overall goal of the course is to provide the opportunity for students to learn, synthesize, and apply concepts and methods of environmental, economic, and social analysis to address real world sustainability questions faced by businesses, government, and institutions. Students will have a choice among a variety of real-world projects to work on. Each project will feature a request for proposals that lists a number of goals, objectives, and specific actions related to that project. Students will develop a proposal that meets the

given request for proposals and at the end of the term, they will present their findings and recommendations.

- **CIVILEN 4011 and 4012: Global Capstone 1 and 2 (2 credits each) (Prereq 4011: CIVILENG 2410, 2810, 3080, 3130, 3160, 3310, 3510, 3540, 3541, 3700, 4320 or 4350, and ENVENG 3200; or permission of instructor; Prereq: enrollment in engineering major, 4011 and Senior standing; or permission of instructor).** The global capstone design course sequence is designed to give the student "real world" engineering experience in a global development context. Whether they ultimately work for the public sector, industry, a consulting firm or academia, students will need to apply the skills and knowledge they have gained through coursework and experiential learning opportunities at The Ohio State University to solve problems, propose solutions and create designs. Often the issues are complex with multiple solutions, all of which have varying costs and benefits. In addition, the issues students need to address are often outside of their current knowledge and comfort zone, requiring them to do some research and/or reach out to others for help. Therefore, this class takes a team approach, which is often the case in "real world" engineering, where individuals with different competencies work together to solve problems and create designs. Each team will work together on a project throughout the next two semesters and will ultimately present a solution for their topic by means of an oral presentation, written report, and engineering drawings.

- **SOCWORK 5018 / HTHRHSC 5000 / PHR 5000 / NURS 5000: Interdisciplinary Case Management for Working with Underserved Populations (2 credits) Prereq: Prereq: Enrollment in Medical Dietetics, Medical Laboratory Science, or Respiratory Therapy major, or Grad standing in Physical Therapy, Occupational Therapy, AlliMed, or HthRhSc; or permission of instructor).** This course provides students the opportunity to collaborate with students from other health care professions including medicine, pharmacy, nursing, health and rehabilitation sciences, and social work. The students will use a problem-based learning approach to patient care in community health, focusing on populations living in poverty with complex healthcare needs. The groups will be interdisciplinary, and students will work through patient cases together. Opportunities for experiential learning will be incorporated into the course. By the end of the course students will have a better appreciation of the roles and scope of practice of the different professions, the healthcare issues and needs of those living in poverty, and the impact of a team approach to patient care.

- **GERMAN / SCANDVN 3354: From Viking Saga to Climate Fiction: Nature in Nordic and Germanic Literatures (3 credits).** The course represents and advanced study of the focal theme, Sustainability, as it deeply engages the ways in which Nordic and Germanic literatures and cultures represent and conceptualize human-nature relationships. Students will analyze how literary texts, films, TV shows, comics, and other cultural artifacts show how humans depend on nature for both their survival and their enjoyment, as well as for the political ways in which they organize their societies. On the background of current science, culture, and societies, and their own experiences,

students will critically analyze the values manifest in the human-nature relationships depicted in Nordic and Germanic cultures, as well as the sustainability of the technological and organizational solutions that Nordic and Germanic cultures presents for problems related to human-nature relationships including the provision of sufficient and satisfying nutrition, housing, clothing, means of transportation, or leisure activities. Students will also investigate the development of attitudes and solutions concerning sustainable human-nature relationships over time as well as their geographical differences. The course contains a research component, as every student will work, throughout the semester, on a final research paper. In order to prepare students to engage with research on their chosen topic, related to the materials of the course, students will read a research article for every topic and week of the semester.

- **GEOG 3900: Global Climate Change: Causes & Consequences (3 credits)**. Understanding the causes of global climate change requires knowledge of the Earth system – its climate, energy balance, and biogeochemical cycles – and both the natural and human- caused factors that drive climate change. The consequences of climate change are widespread and complex, so that effectively managing solutions involves first understanding the diverse impacts throughout the Earth system and human society, then addressing political and economic dimensions related to development and energy conversion technology. We will build upon fundamental concepts to understand Earth's changing climate over different time scales and engage the consequences of climate changes currently facing our planet. We will examine the key evidence of climate change and learn directly from climate researchers how they conduct their science. In addition, we will explore links between climate and society's energy demands, sources, and usage. By the end of the class, students will be more energy literate, and able to critically evaluate divergent facts about climate presented in media sources.

- **COMM 2596: Communicating Science, Health, Environment, and Risk (3 credits).** This course provides a general introduction to the fields of science, risk, environmental and health communication from multiple perspectives including psychological, social, cultural, and sustainability sciences. Students will apply theories and research covered in class to address real-world challenges of communicating science, health, environment, and risk to wide audiences.

- **COMM 3332: Risk Communication (3 credits).** Students will learn how to plan, implement, and evaluate a risk communication effort. Message design is an integral part of this class. Communicating hazards and risks to the public is often a task of communication and public relations professionals. This course will build your knowledge of risk communication theory and research, including the individual and social factors that influence actions to protect against risks and the role of mass media. Students will also explore the risk communication planning process, which will provide tools and strategies for developing and evaluating risk communication messages.

- **COMM 4240: Science Communication (3 credits).** This course is a seminar focusing on the theory and practice of science communication to public audiences, designed for both communication majors and non-majors. Topics include how audiences understand and process science information, expert communication by scientists and policy-makers to public audiences, informal communication about science in museums and science centers, science journalism, the role of the mass media in shaping understanding and beliefs about science, edu-tainment and documentaries, and citizen-science. We will also focus heavily on the role that communication processes play in publicly controversial scientific issues such as Covid-19, global climate change, autism and vaccines.

- **HISTORY 2701: History of Technology (3 credits) (Prereq: English 1110.xx, or completion of GE Foundation Writing and Information Literacy Course).** From fire, the wheel and the stirrup and to drones, iPhones and the Anthropocene, human history is inexplicable without understanding technology. This course provides an introductory overview of the multiple ways in which technology has shaped human practices throughout history. It has two halves: the first half, running up to week 5, offers a history of technology from medieval China to the second Industrial Revolution of the late nineteenth and early twentieth century. The second half explores numerous themes in the history of technology, including war, gender, disaster, culture, and the environment. Although the bulk of the course focuses on developments in Europe and the US, a global focus is maintained throughout.

- **HISTORY 2703: History of Public Health, Medicine and Disease (3 credits) (Prereq: English 1110.xx, or completion of GE Foundation Writing and Information Literacy Course).** This class provides a wide-ranging, introductory survey of the history of health and disease, ranging from the infectious disease in early human communities to today's emerging epidemics and health risks. We will study major epidemics – plague, smallpox, influenza – as well as the various transitions leading to the rise of noncommunicable diseases – cancer, heart disease, diabetes – as major killers in the developed world. We will also attempt to situate our current COVID-19 pandemic within this longer history. The course will also investigate the history of other types of bodily and psychological affliction, particularly occupational, environmental, and mental health. Finally, the course is not simply about various types of disease. It is also about how different societies have conceptualized and encouraged practices designed to improve, nurture, and maintain health (health itself being conceived differently by different people at different times and places). We will spend a considerable amount of time on public health schemes, as well as practices like washing, diet, cleaning, and physical fitness.

- **AGRCOMM 2330: Public Perceptions of Agricultural and Environmental Issue (4 credits) (Prereq: Completion of GE Foundation Writing and Information Literacy).** Introduction to design principles and skills needed to clearly and effectively report research results and technical information in both academic and nonacademic

communication contexts in food, agricultural, and environmental sciences. By the end of this course, students will be able to develop research- and data-driven messages for both scientific and lay audiences; articulate key design principles related to effective visual communication; and use professional design software to produce charts, graphs, infographics, posters, and other data visualizations for both academic and nonacademic research presentations.

- **AGRCOMM 2330 Public Opinion and Agricultural and Environmental Issues (4 credits).** Students will explore vital issues in food, agricultural, and environmental sciences and will develop and practice methods to critically evaluate, effectively communicate, and influence decisions made about these issues. They will engage with issue stakeholders and investigate the impacts that varying perceptions have on the food system, the environment, and society. By the end of this course, students should successfully be able to: identify selected critical issues in food, agriculture, and the environment; explore and objectively discuss alternative points of view about each issue; formulate questions/hypotheses to address or resolve each issue; identify the impediments to the resolution of issues; prepare and submit detailed written and verbal analyses of various viewpoints for selected issues; make use of subject-matter experts in collecting data to inform discussion of selected issues; participate in constructive discussions regarding issues and their possible solutions; and design a research study, collect, analyze, and report findings of qualitative research data from key stakeholders.

- **COMPSTD 4420 Cultural Food Systems and Sustainability (3 credits).** How do human societies around the world respond and adapt to the challenges of food production and consumption in times of change? What cultural practices help define approaches to and/or understandings of sustainability? Considering food as both a material good and marker of individual or collective identity, this interdisciplinary course asks students to think about how food systems are being transformed amid societal, cultural, environmental, political, etc., change at local/regional, national, and global scales. Throughout the semester, we will compare and contrast the experiences of individuals and communities, thinking reflexively of how thematic case studies inform students' understandings of the overall complexity of food and foodways (i.e., socio-cultural practices related to food production and consumption) in and outside of the United States.

- **COMPSTD 2340 Introduction to Cultures of Science and Technology (3 credits**). This course offers an introduction to the interdisciplinary field of Science and Technology Studies. Science and Technology Studies, often referred to as STS, examines how science and technology are shaped by and shape culture and society. STS brings the sciences, social sciences, and humanities together by asking questions such as: How do we know what we know? What do we mean when we talk about things like scientific knowledge and methods? How do historical and social contexts shape technological production, and how does technology in turn shape our world, experiences, and relationships? As

we address these questions, we will familiarize ourselves with critical thought about science and technology, including key historical, sociological, and anthropological theories.

Administrative Arrangement for the Proposed Program

The program will be administered by the same team that administers the Graduate Interdisciplinary Specialization (GIS) in Wicked Science: Mark Moritz (faculty lead) and Cameron Beason, the current undergraduate advisor in the Department of Anthropology. The faculty lead will be assisted by an advisory board that consists of eight members. The current board consists of faculty from different departments: Alison Bennett (EEOB), Nicholas Kawa (Anthropology), Lisa Frazier (Public Policy), Fabienne Munch (Design), two graduate students: David Hibler (EEOB) and Lauren Chivington (English), and two undergraduate students: Lydia Wisne (Anthropology) and TBD. There are no term limits to serving on the advisory board. Anyone who is invested in the program in one way or another, including stakeholders from outside the university, is eligible to serve on the advisory board. New members will be invited by the faculty lead and approved by the advisory board.

Program Assessment Plan

We used backward design to develop the learning goals, learning outcomes, and proficiencies for wicked scientists (see below). To figure out the kinds of skills wicked scientists need to tackle wicked problems. We began by asking, given the properties wicked problems, what competencies are required of wicked scientists to address them. Next, we used these learning outcomes and proficiencies to identify which existing university courses we could leverage, and what new courses we needed to develop to train wicked scientists. This is summarized in a curriculum map that connects every learning outcome with different assessments in each of the required courses.

There are two main ways in which we will assess the performance of the program: (1) assessment of the required courses and course components and their effectiveness in training different core competencies using pre-tests and post-tests and embedded assessments of capstone assignment; and (2) an overall assessment of students' core competencies after completion of the program in the capstone course *5515: Careers for Wicked Scientists*. The expectation is that students who complete all the program components and participate in the community of practice will show improved competency development and higher scores across all measures of the program compared to students who partially complete the program or do not participate at all.

First, in all the required courses, we use pre-tests and post-tests to assess whether students are learning the key concepts. For example, in the *5505: Wicked Science* course, we ask five simple questions using Qualtrics at the start and end of the semester to assess whether students met the learning outcomes.

1. What are wicked problems? Please explain in your own words.
2. What are the attributes of wicked problems? List as many as you know.
3. What are three examples of a wicked problem?
4. What is wicked science? Please explain in your own words.
5. What are the skills of wicked scientists? List as many as you know.

Second, in the capstone course *5515: Careers for Wicked Scientists*, students develop a career portfolio that consists of materials to secure and launch a career as wicked scientist in a wide range of fields, including a CV/resume, cover letter, and LinkedIn profile. Students will include work from each of the three required courses for the specialization that demonstrates their development of the wicked competencies. The portfolio will be organized and curated in a way that allows the instructor and the professional panel to trace the students' growth as a wicked scientist. While most of the included items will originate from assignments completed for courses in the certificate program, students are also encouraged to include work from other courses, internships, extracurricular activities, and relevant life experiences. In their portfolio, students are expected to clearly demonstrate the following learning goals of the certificate program: (1) using a systems-thinking approach that seriously considers politics, i.e., the roles, interests, and perspectives of stakeholders; (2) collaborate effectively with stakeholders and team members from diverse personal and disciplinary backgrounds and experiences; (3) communicate scientific research and ideas to diverse audiences and through different modalities; (4) meet ethical, collegial, and professional expectations and standards in collaborative research and other professional endeavors: and (5) articulate a sense of purpose and develop competencies, skills, and habits that prepare them for life-long learning about and engaging with wicked problems. In their resume, for example, students will use the verb-subject-outcome formula to demonstrate they have developed the skills to work in interdisciplinary teams with people from different backgrounds in the work they did in the *PUBAFRS 5620: Rapid Innovation for Public Impact* course.

Learning Goals, Outcomes, and Proficiencies

The goal of the Certificate in Wicked Science is to train students to become wicked scientists, who have the skills and attitudes to tackle wicked problems, and this entails that students will be able to:

A. Tackle wicked problems using a systems-thinking approach that considers the roles, interests, and perspectives of stakeholders.
B. Collaborate effectively with stakeholders and team members from diverse backgrounds and experiences to tackle wicked problems.
C. Communicate effectively scientific research and ideas to diverse audiences and through different modalities.
D. Meet ethical, collegial, and professional expectations and standards in collaborative research and other professional endeavors.
E. Articulate a sense of purpose and develop habits that prepare them for life-long learning about and engaging with wicked problems.

There are three different levels: goals, outcomes, and proficiencies

A. Learning goal

1. Learning outcome

a. Proficiency (Beginner, Intermediate, Advanced)

A. **Students will be able to tackle wicked problems using a systems-thinking approach that considers the roles, interests, and perspectives of stakeholders.**

1. Explain what wicked problems are.
    a. Explain the primary characteristics of wicked problems (B)
    b. Apply concept of wicked problems to problems that affect one's life and the lives of others. (B/I)
2. Analyze the dynamics, complexities, and interdependencies of wicked problems.
    a. Describe the complex systems that create and perpetuate wicked problems. (B/I)
    b. Analyze interdependencies and system dynamics of a wicked problem. (I)
3. Critically analyze the roles, interests, and perspectives of different stakeholders in wicked problems.
    a. Recognize stakeholders and their respective interests in and conceptions of a given wicked problem. (B)
    b. Analyze how wicked problems affect the interests of different stakeholders. (A)
4. Co-design a (research) project that tackles a wicked problem.

a. List and prioritize research questions that will help to understand the wicked problem and its feedbacks. (B/I)
b. Identify team members relevant to develop and answer the research questions (I)
c. Identify questions that can be answered and questions that may only be partially answered. (A)
d. Identify methodological approaches that can be used to collect and analyze the data to answer the questions. (A)
e. Reflect on possible unintended consequences of intervention into the wicked problem. (A)

B. **Students will effectively collaborate with stakeholders and team members from diverse backgrounds and experiences to tackle wicked problems.**

1. Leverage the diversity among stakeholders to tackle wicked problems.
    a. Identify how backgrounds shape stakeholder values, interests, worldviews, and moral and ethical lenses. (B)
    b. Reflect on how personal background shapes one's own values, interests, worldviews, and moral and ethical lenses. (B)
    c. Recognize that one's own values, interests, worldviews, and moral and ethical lenses are not "normal" or "natural". (I)
    d. Appreciate diversity in knowledge, beliefs, and practices as benefits and not as deficits in tackling wicked problems. (I)
    e. Leverage diversity to imagine new and creative ways to tackle wicked problems. (A)
2. Know how to develop rapport, trust, and a sense of community in teams with stakeholders of diverse backgrounds.
    a. Participate in stakeholder events and activities. (B)
    b. Listen to stakeholder concerns and interests (I).
    c. Demonstrate curiosity and interest (I).
    d. Represent other values and perspectives with respect. (A)
3. Coordinating a (research) project that is intentionally collaborative, diverse, and equitable.
    a. Identify potential stakeholders that represent diverse backgrounds and expertise. (B)
    b. Include stakeholders in the research activity through collaboration in the project design, implementation, and evaluation. (B/I)
    c. Consider how tasks and responsibilities are administered fairly and equitably among research collaborators and participants. (I)
    d. Know how to obtain necessary permissions and approvals from research institutions and participating organizations. (I)
    e. Recognize how to leverage diverse perspectives and expertise to tackle wicked problems during all project phases. (A)

C. **Students will be able to effectively communicate scientific research and ideas to diverse audiences and through different modalities.**

1. Communicate research on wicked problems to academic audiences.
    a. Evaluate the different academic venues available for communicating their work. (B)
    b. Select the most appropriate academic venues for their work. (B)
    c. Use the norms and structures of academic communication. (I)
    d. Write clearly, compellingly and in appropriate formats for selected audiences. (A)
    e. Present clearly, compellingly and in appropriate formats for selected audiences. (A)
2. Explain wicked problems and the study thereof to broader audiences.
    a. Recognize that different audiences have different needs (e.g., because of age, values, interests, educational background). (B)
    b. Explain the requirements and expectations for different outlets (e.g., social media, news feeds, podcasts, photovoice, blogs). (I)
    c. Communicate research on wicked problems clearly and compellingly through different media formats to different audiences. (A)
3. Communicate research findings on wicked problems to policy makers and/or business leaders.
    a. Explain the norms and structures of communication in policy and business circles. (I)
    b. Translate research findings into options for actions by policy makers and business leaders that tackle wicked problems. (A)
    c. Present clearly, compellingly and in appropriate formats for policy makers and business leaders. (A)

D. **Students will be able to meet ethical, collegial, and professional expectations and standards in collaborative research and other professional endeavors.**

1. Consider moral, ethical, and professional expectations in collaborative research.
    a. Know historical ethical problems associated with studying of and wrestling with wicked problems. (B)
    b. Know ethical and professional guidelines defined by the professional associations relevant to the student's career. (I)
    c. Demonstrate an ability to reflect on ethical and moral considerations when working with stakeholders and tackling wicked problems (A).
2. Consider issues of justice, beneficence, and autonomy when conducting research with human or animal subjects.
    a. Consider how to respect human subjects, protect their autonomy, and obtain informed consent. (B)

b. Consider and weigh the costs and benefits of the research activities for human subjects. (B)
c. Consider how research activities are administered fairly and equally among potential research participants. (B)
d. Obtain necessary permits, permissions, and approvals for research in a timely manner. (I)
e. Conduct research ethically in accordance with the guidelines of professional organizations. (A)

E. **Students will be able to articulate a sense of purpose and develop habits that prepare them for life-long learning about and engaging with wicked problems.**

1. Plan a career in tackling wicked problems.
    a. Identify career goals and opportunities, including those in the public sector, the private sector, non-profits, or academia. (B)
    b. Formulate an individual development plan. (I)
    c. Build skills for developing and maintaining professional networks. (I)
    d. Foster collegial relationships with peers and stakeholders. (A)
2. Recognize one's motivations for tackling a given wicked problem.
    a. Articulate one's personal reasons for tackling a given wicked problem. (B)
    b. Consider how one's motivations compare with or differ from other collaborators when addressing a given wicked problem. (I)
3. Recognize individual qualities necessary to be successful in collaborative projects.
    a. Identify the habits and attributes of effective collaborators that facilitate effective group interactions. (B)
    b. Adopt and employ habits used by effective collaborators in diverse, transdisciplinary teams. (I)
    c. Seek mentorship and mentor others regarding collaborative behaviors and habits. (A)
4. Cultivate the attitude and courage for tackling wicked problems.
    a. Articulate what one does not know about a given problem. (B)
    b. Question one's own assumptions about one knows about a problem. (I)
    c. Appreciate the complexity, politics, and distinctiveness of the problem. (I)
    d. Recognize the value of wrestling with wicked problems regardless of the results. (A)
    e. Have fun. (A)

The Ohio State University
College of Arts and Sciences
Wicked Science Certificate – Type 1a, 1b, and 2

Advising Contacts:
Cameron Beason, Undergraduate Advisor, Department of Anthropology 4060 Smith Laboratory, beason.11@osu.edu, 614-292-6961

Faculty Contact:
Dr. Mark Moritz, Professor, Department of Anthropology, 4058 Smith Laboratory, moritz.42@osu.edu, 614-247-7426

The purpose of the certificate is to train students to become wicked scientists – researchers with the skills and attitudes to tackle wicked problems. This entails that students use a systems-thinking approach that seriously considers the roles, interests, and perspectives of stakeholders, learn to collaborate effectively with stakeholders and team members from diverse backgrounds and experiences, be able to communicate scientific research and ideas to diverse audiences and through different modalities, meet ethical, collegial, and professional expectations and standards in collaborative research and other professional endeavors, and articulate a sense of purpose and develop competencies, skills, and habits that prepare them for life-long learning about and engaging with wicked problems.

The Wicked Science certificate requires a minimum of 12 credits as follows:

Three core courses (all required):
ANTHROP/EEOB 5505: Wicked Science (3 CH), EEOB/ANTHROP/ENR/VETPREV 5510: Interdisciplinary Team Science (3 CH), and ANTHROP 5515: Careers for wicked scientists (1 CH).

One of the following two elective courses:
PUBAFRS 5620: Rapid Innovation for Public Impact (4 CH), or DESIGN 5650: Advanced Collaborative Design (3 CH).

One elective course (of 2 or more credits). Possible electives include, but are not limited to:
ENGLISH 3020: Writing about Sustainability (3 CH).
ENGLISH 3304: Business and Professional Writing (3 CH).
CIVILEN 4011: Global Capstone 1 (2 CH).
CIVILEN 4012: Global Capstone 2 (2 CH).
KNOW 2310: Seeing and Making (Studio) (4 CH).
PUBAFRS 2620: Contemporary Issues in Science, Engineering, and Technology Policy (3 CH).
DESIGN 4650: Collaborative Design Studio (3 CH)
ESHESA 2570: Team and Organizational Leadership (3 CH).
ENR/AEDE 4567: Assessing Sustainability: Project Experience (3 CH).
SOCWORK 5018 / HTHRHSC 5000 / PHR 5000 / NURS 5000: Interdisciplinary Case Management for Working with Underserved Populations (2 CH).
GERMAN / SCANDVN 3354: From Viking Saga to Climate Fiction: Nature in Nordic and Germanic Literatures (3 CH).
GEOG 3900: Global Climate Change: Causes & Consequences (3 CH).
COMM 2596: Communicating Science, Health, Environment, and Risk (3 CH).
COMM 3332: Risk Communication (3 CH).
COMM 4240: Science Communication (3 CH).
HISTORY 2701: History of Technology (3 CH).
HISTORY 2703: History of Public Health, Medicine and Disease (3 CH).
AGRCOMM 2330: Public Opinion and Agricultural and Environmental Issues (4 CH).
AGRCOMM 2330 Public Perceptions of Agricultural and Environmental Issue (4 CH).
COMPSTD 2340: Introduction to Cultures of Science and Technology (3 CH).
COMPSTD 4410: Cultural Food Systems and Sustainability (3 CH).

Wicked Science Certificate Program Guidelines

Credit hours required: A minimum of 12.
Overlap with degree program: A student is permitted to overlap up to 50% of credit hours between other degree programs (major, minor, other certificate, or general education) and the certificate program.
Grades required: Minimum C- for a course to be counted on the certificate, and a minimum 2.00 cumulative GPA for all certificate course work.
Certificate approval: The certificate course work must be approved by a College/School advisor.
Consult with advisor for filing deadlines or for changes or exceptions to a certificate plan.

College of Arts and Sciences.
Curriculum and Assessment Services
306 Dulles Hall, 230 Annie & John Glenn Ave.
http://artsandsciences.osu.edu

Approved CAA xx/xx/20xx.

Undergraduate Certificate in Wicked Science

CERTIFICATE COMPLETION SHEET

Name:	
Email:	
Primary program:	

Course number and name	Course grade	Semester completed
ANTHROP/EEOB **5505: Wicked Science**		
EEOB/ANTHROP/ENR **5510: Interdisciplinary Team Science**		
One of the following:		
PUBAFRS **5620: Rapid Innovation for Public Impact**		
DESIGN **5650: Advanced Collaborative Design**		
An elective course (2 or more credits):		
ANTHROP **5515: Careers for Wicked Scientists**		

Total credits (12 – 15): _____

Certificate advisor name and signature: _____

Date: _____

Concurrence emails

From: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Date: Monday, July 24, 2023 at 09:58
To: _ASC NMS Chairs Directors <ASC-nms-chairs-directors@osu.edu>, _ASC SBS-Chairs <ASC-SBS-Chairs@osu.edu>, _ASC AH-Chairs-Directors <ASC-ah-chairs-directors@osu.edu>
Cc: Moritz, Mark <moritz.42@osu.edu>
Subject: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Chairs and Directors,

Please find attached a proposal for a new undergraduate certificate from the Department of Anthropology: "Wicked Science."

The department is seeking concurrence for the new certificate. Please email your responses/concurrences to Professor Mark Moritz (moritz.42@osu.edu) in the Department of Anthropology. ***Responses are due within two weeks***. Concurrence will be assumed if no response is received within two weeks (August 7, 2023).

Many thanks,
Bernadette

THE OHIO STATE UNIVERSITY

Bernadette Vankeerbergen, Ph.D.
Assistant Dean, Curriculum
College of Arts and Sciences
114F University Hall, 230 North Oval Mall
Columbus, OH 43210
Phone: 614-688-5679
http://asccas.osu.edu

From: "Moritz, Mark" <moritz.42@osu.edu>
Date: Monday, July 24, 2023 at 3:38 PM
To: "Clinchot. edu" <clinchot.1@osu.edu>
Subject: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Daniel,

Please find attached a proposal for a new undergraduate certificate from the Department of Anthropology: "Wicked Science". I am happy to answer any questions you may have about the proposal.

Our department is seeking concurrence for the new certificate. Please email your responses/concurrences to me. **Responses are due within two weeks**. Concurrence will be assumed if no response is received within two weeks (August 7, 2023).

Many thanks,

Mark

Dr. Mark Moritz (he/him/his)
Professor, Wicked Scientist, Director of Graduate Studies
Department of Anthropology, The Ohio State University
4058 Smith Laboratory
174 W. 18th Avenue, Columbus, OH 43210
moritz.42@osu.edu | https://mlab.osu.edu | https://u.osu.edu/wicked/
614-247-7426

Department, Center, Institution	college	Contact	email	concurrence
English	ASC	Elizabeth Hewitt	hewitt.33@osu.edu	received
Mershon Center	ASC	Dorothy Noyes	noyes.10@osu.edu	received
Slavic and East European Languages and Cultures	ASC	Angela Brintlinger	brintlinger.3@osu.edu	received
Near Eastern and South Asian Languages and Cultures	ASC	Morgan Liu	liu.737@osu.edu	received
Germanic Languages and Literatures	ASC	Carmen Taleghani-Nikazm	taleghani-nikazm.1@osu.edu	received
Statistics	ASC	Elly Kaizar	kaizar.1@osu.edu	received
Psychology	ASC	Duane Wegener	wegener.1@osu.edu	received
Molecular Genetics	ASC	Harold Fisk	fisk.3@osu.edu	received
Sociology	ASC	Kristi Williams	williams.2339@osu.edu	received
Geography	ASC	Mat Coleman	coleman.373@osu.edu	received
Theatre, Film, and Media Arts	ASC	EJ Westlale	westlake.35@osu.edu	received
Communication	ASC	Kelly Garrett	garrett.258@osu.edu	received
History	ASC	Birgitte Søland	soland.1@osu.edu	received
Comparative Sudies	ASC	Phlip Armstrong	armstrong.202@osu.edu	received
Concurrence is assumed from all the other departments in the College of Arts and Sciences that have been contacted but not responded.				

College, name, dot.number (title)	concurrence
CFAES: Jeanne Osborne.2 (Assistant Dean)	received
Engineering: Dave Tomasko.1 (Associate Dean)	assumed
Public Health: Michael Bisesi.12 (Associate Dean)	received
Business: Andrea Prud'homme (prudhomme.3) (Associate Dean)	received
Law: Anne Ralph.52 (Associate Dean)	received
John Glenn College of Public Affairs: Rob Greenbaum.3 (Associate Dean)	received
Medicine: Daniel Clinchot.1 (Vice Dean)	received
Veterinary Science: Emma Read.65 (Associate Dean)	assumed
Nursing: Cindy Anderson.2765 (Associate Dean)	received
Social Work: Sharvari Karandikar.7 (Associate Dean)	received
EHE: Anastasia Snyder.893 (Interim Associate Dean)	assumed
Pharmacy: Katherine Kelley.168 (Associate Dean)	assumed

From: Hewitt, Elizabeth <hewitt.33@osu.edu>
Sent: Monday, July 24, 2023 11:06 AM
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Bernadette,

The Department of English is very pleased to provide concurrence for the new certificate from the Department of Anthropology, "Wicked Science"!

Best wishes,
Beth

From: Noyes, Dorothy <noyes.10@osu.edu>
Date: Monday, July 24, 2023 at 13:47
To: Moritz, Mark <moritz.42@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark,

Congratulations on this excellent proposal! Sometime I hope we can discuss how Mershon might assist in your efforts – and conversely some wicked-science consultation on one of our current projects would be useful at some point.

We are just back from a long trip including a great week in the Netherlands with a stop at the jazz festival. Hard to leave that behind and come home to this, but we'll perhaps see you soon at the polling place.

All the best,

Dorry

Dorothy Noyes
Director, Mershon Center
Professor, English, Comparative Studies
The Mershon Center for International Security Studies
1010 Derby Hall, 154 N. Oval Mall
The Ohio State University
Columbus, OH 43210
noyes.10@osu.edu

From: Brintlinger, Angela <brintlinger.3@osu.edu>
Sent: Monday, July 24, 2023 3:11 PM
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Bernadette, SEELC approves!

Very cool.

Angela

From: Ralph, Anne E. <ralph.52@osu.edu>
Date: Monday, July 24, 2023 at 15:51
To: Moritz, Mark <moritz.42@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi, Mark,
Thanks for your email. The College of Law is pleased to grant concurrence. Please let me know if the College of Law can help in any other way.
Very best,
Anne

THE OHIO STATE UNIVERSITY

Anne E. Ralph
Morgan E. Shipman Professor in Law & Associate Dean for Academic Affairs
Michael E. Moritz College of Law
55 West 12th Avenue | Columbus, OH 43210
614-247-4797 Office | **ralph.52@osu.edu**
Pronouns: she/her/hers

From: Bisesi, Michael <bisesi.12@osu.edu>
Date: Tuesday, July 25, 2023 at 06:51
To: Moritz, Mark <moritz.42@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

Mark,

Your proposed undergraduate certificate does not conflict with present or planned certificate programs offered by the College of Public Health.
Accordingly, we support your proposal.

Mike

THE OHIO STATE UNIVERSITY

Michael S. Bisesi, MS, PhD, REHS, CIH
Vice Dean, Academic Affairs & Academic Administration
Professor & Chair, Environmental Health Sciences
College of Public Health
Senior Strategic Advisor, OSU Global One Health initiative (GOHi)
Administrative Chair, Sustainability Education and Learning Committee
Fellow AIHA
Phone: (614) 247-8290 Email: bisesi.12@osu.edu
(Administrative Assistants Samantha Hicks (614) 688-3822 hicks.598@osu.edu or
Mindy Freed freed.28@osu.edu)

From: Liu, Morgan <liu.737@osu.edu>
Date: Tuesday, July 25, 2023 at 08:40
To: Moritz, Mark <moritz.42@osu.edu>
Subject: FW: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark,

A big yes from NESA in concurrence for the Wicked Sciences certificate. I think this program, along with your publications in recent years on this subject are a bold, innovative project. Best wishes on all that!

Best wishes, Morgan

From: Taleghani-Nikazm, Carmen <taleghani-nikazm.1@osu.edu>
Date: Tuesday, July 25, 2023 at 08:57
To: Moritz, Mark <moritz.42@osu.edu>
Cc: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi Mark,

Hope all is well and that you've been having a great summer!

Our director of Undergraduate Studies, Matthew Birkhold, and I reviewed the proposal and found it great! GLL is happy to provide concurrence for your certificate. We also ask if you would please consult the list of courses that currently count toward the Environmental Humanities minor as potential elective courses.

https://artsandsciences.osu.edu/academics/programs/minors/environmental-arts-and-humanities

all the best,
Carmen

THE OHIO STATE UNIVERSITY

Carmen Taleghani-Nikazm
Professor
Chair, Department of Germanic Languages and Literatures
438 Hagerty Hall
1775 College Rd, Columbus, OH 43210
614-292-6985 Office
taleghani-nikazm.1@osu.edu

From: Prud'homme, Andrea <prudhomme.3@osu.edu>
Date: Tuesday, July 25, 2023 at 10:56
To: Moritz, Mark <moritz.42@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

Mark:

This looks like such a fun and interesting program.

Fisher is fine and does't have any concurrence issues.

Andrea

Andrea M. Prud'homme, PhD, CPIM-F, CSCP, CLTD, CIRM
200D Fisher Hall
Fisher College of Business
Associate Dean Undergraduate Programs & Students
Associate Professor – Clinical, Dept. of Operations & Business Analytics
614.292.3173 Office
Pronouns: she/her/hers

From: Kaizar, Elly <kaizar.1@osu.edu>
Date: Tuesday, July 25, 2023 at 16:29
To: Moritz, Mark <moritz.42@osu.edu>
Cc: Craigmile, Peter <pfc@stat.osu.edu>, Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark,

The Department of Statistics gives concurrence for the new undergraduate certificate from the Department of Anthropology: "Wicked Science." Best wishes for the program.

Regards,
Elly

Eloise Kaizar, PhD
Professor and Chair
Department of Statistics
221 Cockins Hall
Ohio State University
(614) 247-2585

From: Wegener, Duane <wegener.1@osu.edu>
Date: Wednesday, July 26, 2023 at 07:46
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Cc: Moritz, Mark <moritz.42@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

The Psychology Department concurs.
Best wishes,
Duane

THE OHIO STATE UNIVERSITY

Duane T. Wegener (he/him/his)
College of Arts and Sciences Distinguished Professor of Psychology
Chair, Department of Psychology
Psychology Building, Room 225A, 1835 Neil Avenue, Columbus, OH 43210
614-292-3038 Office
wegener.1@osu.edu

From: Fisk, Harold <fisk.13@osu.edu>
Sent: Wednesday, July 26, 2023 3:18:37 PM
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Cc: Andrews, Adam <andrews.171@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi Bernadette,

Both I and the CLSE Assistant Director for Curriculum have looked over the proposal. The CLSE, and by extension the Biology major, have no objections to the proposed certificate! Looks great!

Sincerely,
Harold

Harold A. Fisk, Ph.D. (he/him/his)
Associate Professor | **The Ohio State University**
Department of Molecular Genetics
Interim Director, Center for Life Sciences Education
484 W. 12th Ave., Columbus, OH 43210-1292 | 614-292-0318 | fisk.13@osu.edu

From: Williams, Kristi <williams.2339@osu.edu>
Sent: Wednesday, July 26, 2023 6:02:15 PM
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Cc: Downey, Douglas <downey.32@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi Bernadette,

Sociology is happy to provide concurrence for this certificate program.

Best,
Kristi

THE OHIO STATE UNIVERSITY

Kristi Williams, PhD
Professor and Chair
Department of Sociology
238 Townshend Hall, 1885 Neil Avenue Mall, Columbus, OH 43210
6146883207 Office
williams.2339@osu.edu / sociology.osu.edu

first gen
OHIO STATE

THE OHIO STATE UNIVERSITY

Daniel M. Clinchot, MD
College of Medicine
Vice Dean for Education
Associate Vice President for Health Sciences Education
260 Meiling Hall
370 West 9th Ave
Columbus, OH 43210-1238
614-688-3104 Office
614-292-4499 Fax
Dan.Clinchot@osumc.edu

July 28, 2023

Mark Moritz, PhD
Professor, Director of Graduate Studies
Department of Anthropology, The Ohio State University
4058 Smith Laboratory
174 W. 18th Avenue, Columbus, OH 43210

Dear Professor Mortiz,

The College of Medicine and School of Health & Rehabilitation Sciences has reviewed the "Wicked Science" undergraduate certificate from the Department of Anthropology. We would like to provide our full concurrence for this course.

Please do not hesitate to contact me if I can provide further information in support of this proposed course.

Sincerely,

Daniel M. Clinchot, MD
Vice Dean for Education
Associate Vice President for Health Sciences Education
Chair, Department of Biomedical Education & Anatomy
Harry C. and Mary Elizabeth Powelson Professor of Medicine
Professor, Physical Medicine & Rehabilitation
College of Medicine

From: Coleman, Mathew <coleman.373@osu.edu>
Date: Friday, July 28, 2023 at 10:37
To: Moritz, Mark <moritz.42@osu.edu>, Houser, Jana <houser.262@osu.edu>
Subject: FW: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi Mark—

Geography is happy to concur with this request, the certificate looks great.

I do have one question. As it is written, students petition to get courses added as electives. Is there possibly a mechanism for departments to approach you with suitable courses?

We have GEOG 3900 (Global Climate Change) (https://geography.osu.edu/courses/geog-3900), taught by my colleague Bryan Mark, which I think would be a terrific addition. And Ellen Mosley Thompson teaches GEOG 3901H (Global Climate and Environmental Change) (https://geography.osu.edu/courses/geog-3901h), which I also think could be useful. Both courses emphasize the complexity, interdependencies, and dynamism of climate change as a 'system', as well as the methodological complexities that underpin the science.

Thanks, and happy summer, what's left of it!
Mat

Cc Jana Houser, Director of Undergraduate Studies, Geography

THE OHIO STATE UNIVERSITY

Mat Coleman
Professor and Department Chair
Department of Geography, College of Social and Behavioral Sciences
http://u.osu.edu/coleman.373/

1036B Derby Hall (main office suite)
154 N. Oval Mall
Columbus, OH 43210-1361

From: Westlake, E.J. <westlake.35@osu.edu>
Date: Saturday, July 29, 2023 at 17:41
To: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Cc: Moritz, Mark <moritz.42@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

We concur.

E.J. Westlake
(she/her or they/them)
Professor and Chair
Department of Theatre, Film, and Media Arts

From: Garrett, Kelly <garrett.258@osu.edu>
Date: Monday, July 31, 2023 at 10:00
To: Moritz, Mark <moritz.42@osu.edu>
Cc: Kline, Susan <kline.48@osu.edu>
Subject: Wicked Science certificate

Good morning, Mark. I'm following up on the Wicked Science certificate that you've proposed. Let me start by saying that Susan Kline and I are both very excited about this certificate. It is such an important problem space, and you've assembled a get set of course.

We'd like to offer a friendly amendment. Given that one of the learning objectives is to teach students to "communicate effectively scientific research and ideas to diverse audiences and through different modalities," we proposed added three comm courses to the list of electives: COMM 2596: Communicating Science, Health, Environment, & Risk, COMM 3332: Risk Communication, and COMM 4240: Science Communication. Course descriptions are included below.

Thanks for your consideration. Please let us know what you think.

Kelly

From: Anderson, Cindy <anderson.2765@osu.edu>
Date: Tuesday, August 1, 2023 at 09:37
To: Moritz, Mark <moritz.42@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

Hello Mark,
The College of Nursing is in full support of this new and very interesting offering.

Best to you,
Cindy

Cindy Anderson, PhD, RN, APRN-CNP, ANEF, FAHA, FNAP, FAAN
Professor and Senior Associate Dean for Academic Affairs and Educational Innovation
Martha S. Pitzer Center for Women, Children and Youth
The Ohio State University College of Nursing
346 Newton Hall
1585 Neil Avenue
Columbus, Ohio 43210
Phone: 614-292-4179; Fax 614-292-4948
Email: Anderson.2765@osu.edu
https://nursing.osu.edu/faculty-and-staff/cindy-anderson

From: Soland, Birgitte <soland.1@osu.edu>
Date: Tuesday, August 1, 2023 at 21:12
To: Moritz, Mark <moritz.42@osu.edu>, Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Cc: Levi, Scott <levi.18@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark Moritz,

The History Department is granting concurrence for the proposed Undergraduate Certificate in Wicked Science.

All best,

Birgitte Søland, Assoc. Prof.

From: Karandikar, Sharvari <karandikar.7@osu.edu>
Date: Thursday, August 3, 2023 at 13:43
To: Moritz, Mark <moritz.42@osu.edu>, Babcock, Jennie <babcock.79@osu.edu>
Subject: Re: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark
Thank you for your email. We can confirm that the College of Social Work provides concurrence for this certificate proposal.

Please let me know if you have additional questions.
Thank you
Sharvari

THE OHIO STATE UNIVERSITY

Sharvari Karandikar, Ph.D.
Professor & Associate Dean of Academic Affairs
Fulbright Specialist (2022-2026)
College of Social Work/The Ohio State University
325-Y Stillman Hall, 1947 N College Road
Columbus Ohio 43210
Ph. No. 614-292-0653
http://csw.osu.edu/about/faculty-staff/faculty-directory/karandikar-chheda-sharvari-ph-d/
Pronouns: she, her, hers.
To learn more about pronouns use this link

From: Greenbaum, Rob <greenbaum.3@osu.edu>
Date: Friday, August 4, 2023 at 16:40
To: Moritz, Mark <moritz.42@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

Hi Mark,

The John Glenn College of Public Affairs is pleased to provide concurrence for the proposed Wicked Science undergraduate certificate.

Sincerely,

Rob

THE OHIO STATE UNIVERSITY

Robert T. Greenbaum
Associate Vice Provost for Academic Programs
Office of Academic Affairs
Professor, Associate Dean for Curriculum
John Glenn College of Public Affairs
350E Page Hall, 1810 College Road, Columbus, OH 43210
614-292-9578 Office / 614-292-2548 Fax
https://glenn.osu.edu/rob-greenbaum
Pronouns: he/him/his

From: Armstrong, Philip <armstrong.202@osu.edu>
Date: Monday, August 7, 2023 at 22:33
To: Moritz, Mark <moritz.42@osu.edu>
Cc: Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>
Subject: FW: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark
Comparative Studies is happy to support the Wicked Science initiative.
I would note that my colleagues were surprised not to see any of our courses mentioned in Science and Technology Studies, especially as we now have 3 faculty who are specialists in STS whose work closely intersect with the rationales outlined in the proposal. I imagine this could be addressed as the certificate evolves
Good luck with the new program—sounds exciting
best
Philip

Philip Armstrong
Chair, Comparative Studies

From: Osborne, Jeanne <osborne.2@osu.edu>
Date: Tuesday, August 8, 2023 at 10:40
To: Moritz, Mark <moritz.42@osu.edu>
Cc: Reed, Katie <reed.901@osu.edu>, Vankeerbergen, Bernadette <vankeerbergen.1@osu.edu>, Christy, Ann <christy.14@osu.edu>
Subject: RE: Concurrence Request for Undergraduate Certificate in Wicked Science

Dear Mark,

On behalf of the College of Food, Agricultural, and Environmental Sciences, I am pleased to provide concurrence to the Department of Anthropology for the new undergraduate certificate: "Wicked Science". I requested input from the academic units within the CFAES regarding this proposal, and they are supportive of this initiative. I did have comments from three of the Departments about interest in discussions with your Department about potential courses from their units that might be included as electives in this certificate program:

- **Dr. Lyvers Peffer, Chair, Department of Animal Sciences**: 'the aim of certificate is to "to train undergraduate students to become wicked scientists who are able to tackle the grand challenges of today and tomorrow". This is the essence of what we do in CFAES but I only noticed one cross-listed course with AEDE. They note that they will approve electives as submitted, but I would recommend electives to be included instead of waiting for students to petition to include. For ANIMSCI, the 3600 course could be an option. There may be others that fit as well (perhaps ANIMSCI 4597).'
- **Dr. Caryn Filson, Chair of Academic Affairs Committee, Department of Agricultural Communication, Education, and Leadership**: 'I received feedback from the ACEL Department regarding this proposal. The faculty were anonymously in support of this proposal. However, several faculty commented they felt courses in ACEL would compliment the certificate and asked they be shared with Dr. Moritz:
  - COMLDR 3530: Foundations of Personal and Professional Leadership specifically discusses systems leadership. The instructor also teaches the Leadership Skills module in the EEOB 5510 course that is one of the core courses for the certificate.
  - AGRCOMM 2330: Public Perceptions of Agricultural and Environmental Issues-faculty felt this course would compliment the courses in the certificate.
  - AGRCOMM 5535: Data Visualization and Scientific Storytelling would be a great fit for a skill-building elective in the certificate.
- **Dr. Amy Ando, Chair, Department of Agricultural, Environmental and Development Economics:** 'AEDE is supportive. We would enjoy future conversations with you about whether any of our classes could serve as electives for this certificate.'

We look forward to the offering of this certificate. Please let me know if you have any questions or need additional information.

Best regards,

Jeanne

Jeanne M. Osborne | *Pronouns: She, Her, Hers*
Assistant Dean for Academic Affairs