Program Proposal for an Undergraduate Certificate

1. Name of the proposed undergraduate certificate. *Science Communication*

2. Name of the department(s) involved.
   
   Greenlee School of Journalism and Communication, English, Geological and Atmospheric Sciences

   Collaborating departments: [preliminary list—additions forthcoming and welcome]
   
   Philosophy and Religious Studies, Political Science, Agricultural and Education Studies, Biology, History, Natural Resource Ecology and Management, Sociology, Women’s & Gender Studies.

3. Name of contact person(s).
   
   Dara Wald, Jacqueline Reber, Linda Shenk

4. General description of the undergraduate certificate.

   The science communication certificate provides an opportunity for students to develop their public communication skills, to interface with students and faculty across disciplinary and science-public divides, and to give students an edge in the job market where successful communication with a multitude of stakeholders is essential. As a discipline, science communication brings together theory and practice to communicate scientific information to the public, with an emphasis on two-way and strategic communication with the public.

   *This certificate is designed to encourage students who are interested in the intersection of science and society* to pursue coursework that provides them with the skills to practice public-facing science and effectively engage the public around complex and sometimes controversial scientific topics. In addition, *the certificate is designed to facilitate convergence across disciplines and encourage team-based collaboration* at the undergraduate level.

   As a transdisciplinary certificate, this program will meet the needs of students from across campus, including students from the humanities, social sciences, and STEM fields. Key groups who might be interested in this certificate include students who are planning to pursue science, environmental, health or agricultural communication as a career or students pursuing a career in a science, engineering, math and other technical fields interested in strengthening their communication skills.

   To prepare students for the challenge of communicating effectively at the intersection of science and society, students will take a core of 12-credits from the Greenlee School of Journalism and Communication, the English Department, and the Department of Philosophy and Religious Studies and 9-credits of electives from three tracks: science in practice, science and society, and communication in practice.

   The certificate requires 21 credits, where 9 of the credits taken do not fulfill
any other requirements for other majors or general education. The certificate leverages existing courses as well as proposes two new courses.

Core courses (12 credits):
(1) JLMC/PR/ADVRT 200-levelX Media Controversies in Science and Technology
(2) PHIL 206 Introduction to Logic and Scientific Reasoning
(3) ENGL 312 Biological Communication
(4) JLMC 347 Science Communication
These core courses integrate scientific material with communication skills from a range of disciplines as well as include a public-outreach component.

Elective courses (9 credits):
Students will take one course from each of the three categories of electives: Science in Practice, Science and Society, and Communication in Practice (see list in Item 10). 6 of these 9 credits must be at the 300+ level.
Students who engage in an internship or research experience (including those connected to courses) may seek approval from the steering committee to have this experience counted as an elective course. This experience must include a public-facing communication/outreach component, and the steering committee will decide which of the 3 categories of electives this experience would fulfill. Students who wish to count the internship toward the certificate must track their hours as well as complete a final paper about their experiences.

5. Need for the proposed undergraduate certificate.
“There is a growing consensus that...scientists must engage more fully with the public about scientific issues and the concerns that society has about them” (Science, 2007, p. 161). Yet ten years after this comment, a report by the National Academies of Sciences, Engineering, and Medicine notes that few scientists today have “formal training in science communication...[and] many journalists, institutional public information officers, advocates, and others who communicate science in the course of their work lack training either in science or in the communication of science per se” (NASEM, 2017, p. 12).

Recognizing this need, NSF, NIH, and many universities have developed communication training programs in science communication; however, to date, none of the regent’s universities in Iowa offer a certificate or minor in science communication. The Science Communication Certificate aims to address this gap.

Students who complete the proposed science communication certificate will be able to (1) create, co-produce, and evaluate public-facing science communication; (2)
understand and address the ethical, social, cultural, and historical factors that influence the public communication of science; and (3) promote public and cross-disciplinary understanding of scientific information across diverse and emergent media platforms and audiences.

There are three ways in which the proposed certificate differs from existing programs at other institutions. First, the certificate is designed to facilitate convergence across disciplines and encourage team-based collaboration at the undergraduate level. The current research landscape, driven in part by scientific agencies’ support for transdisciplinary projects, will require future scholars who are prepared to work across traditional disciplinary and science-society divides. Thus, the proposed certificate includes classes designed to attract students across multiple disciplines and use a team-based approach to encourage collaboration.

Second, there remains a pressing need for skilled communicators of science able to develop, practice, and evaluate methods for engaging and co-producing knowledge with the public. This more collaborative approach allows scientific research to have greater impact, to be more locally relevant, and to facilitate trust. Thus, this certificate is designed to prepare students to communicate clearly and in a compelling manner while also encouraging a communication paradigm that embraces the co-creation of knowledge (rather than a “top-down” or science-led approach) and an understanding of the cognitive and socio-cultural variables that influence public interpretations of science, perspectives of scientists, and the acceptance or rejection of scientific advice.

Finally, scientists interested in sharing their findings with the public must navigate the complex intersection between science and society to engage a diversity of audiences with different goals and interests through a myriad of communication platforms and strategies. The proposed certificate is designed to prepare students to understand the origins and dynamics of science-related controversies; identify and address misinformation across social media, blogs, and other social and online networks; and to engage in constructive conversations about contested topics.

Due to the transdisciplinary nature of the certificate, this program would be open to students of any major. However, we have identified several key target groups who are interested in the proposed science communication certificate. The first group includes students who are planning to pursue science, environmental, health or agricultural communication as a career. The Bureau of Labor Statistics predicts faster than average increases in jobs for public relations managers, and advertising and marketing managers between 2019 and 2029. While traditional media outlets such as newspapers have decreased, the need for writers to produce online science content is soaring (Kellogg, 2017, https://www.molbiolcell.org/doi/full/10.1091/mbc.e14-03-0813). For example, academic journals, trade magazines, and general-interest publications need content for their traditional print formats as well as content for their websites, daily online news blogs, and social media networks. While not a comprehensive list, Indeed.com currently has more than 342,000 job posts related to “PR, communication, marketing or advertising” and science.
Students pursuing a career in a science, engineering, math and other technical fields are also interested in this certificate program. Indeed, for them, the science communication certificate will give them an edge in the job market where successful communication with a multitude of stakeholders is essential. Growing public concern about climate change is fueling new opportunities in environmental science and sustainable agriculture. These positions often require strong oral and written communication skills to be able to communicate results or ideas to company managers, regulators, and funders. The proposed certificate capitalizes on the demand for these professionals by offering STEM students the opportunity to develop their communication skills.

6. Objectives of the proposed undergraduate certificate including the student learning outcomes and how the learning outcomes will be assessed.

**Student-focused objectives**

- Encourage students to engage with community members, other students and faculty across interdisciplinary boundaries, diverse backgrounds, and divergent interests.
- Prepare students to communicate scientific findings and technological advances in a clear and compelling manner while also encouraging inclusive communication that acknowledges others’ values and concerns.
- Cultivate students’ understanding of the origins and dynamics of science-related controversies and conflicts.
- Challenge students to identify and address scientific misinformation, scientific skepticism, and science denial across social media, blogs, and other social and online networks.
- Prepare students to engage in constructive conversations with diverse audiences over contested science, environmental, health, and agricultural topics.

**Learning outcomes**

Students who complete the proposed science communication certificate will be able to:

- Create, co-produce, and evaluate public-facing science communication
- Understand and address the ethical, social, cultural, and historical factors that influence both the public communication of science and the rise and spread of science-related controversies
- Promote public and cross-disciplinary understanding of scientific information
- Co-produce knowledge with community stakeholders through public-facing projects
- Create effective and appropriate science messages across diverse and emergent media platforms, addressed to diverse audiences.
- Critically analyze science messages addressed to public audiences around science
- Identify and address misinformation across social media, blogs, and other
social and online networks

- Engage in constructive conversations about contested science, environmental, health, and agricultural topics.

Assessment Plan Ideas

Over the course of completing the certificate, each student will conduct a minimum of three applied, public-facing projects that they will compile, with an accompanying reflection essay, into a final e-portfolio. The e-portfolio materials can be developed during course work required to complete the certificate. For example, in JLMC 347, students are required to create four written articles about science for the public. Two of these products could be used for the portfolio. Students will submit their e-portfolios to the science communication steering committee for assessment, and these e-portfolios may be posted on the Science Communication Project site.

7. Relationship of the undergraduate certificate to other programs at Iowa State University.

The science communication certificate supports programs across LAS and the University, providing students an opportunity to effectively practice public-facing science, bridge traditional science-public divides, and practice effective communication for technical and non-technical audiences.

8. Relationship of the undergraduate certificate to the strategic plans of the university, of the college, and of department or program.

The certificate contributes to Iowa State’s and its Colleges’ emphases on research and educational opportunities that involve issues at the nexus of research and society. Meeting the Grand Challenge Research Themes identified by Iowa State requires cutting-edge research that can develop scientific answers to society’s greatest challenges. Science has already developed many recommendations for improving the health and sustainability of our society, such as reducing carbon emissions, increasing agricultural yields, and conserving water and land. In order for researchers to address society’s greatest challenges, they must involve public stakeholders in the research and communication of their findings to build connections with diverse and often skeptical audiences. The certificate’s emphasis on communication and public-facing projects participates in the university’s goals to provide students with education and practical experiences promote leadership skills, inclusion, and public quality of life.

In the College of Liberal Arts and Sciences, the themes of “Enabling Healthy Lives” and “Building Sustainable Human and Natural Ecosystems” exemplify a key tension at the nexus of science and society: the public consistently expresses high levels of trust in “scientists” (Gauchat, 2010, 2012) while at the same time rating specific scientific results or scientists as biased and untrustworthy (Funk & Kennedy, 2016). Public trust in science and perceptions of scientific credibility are critical shortcuts, or heuristics, that people use when forming opinions about science (Brossard & Nisbet, 2007). Public opinions about
science and acceptance of scientific information will inform social, economic and political approaches to address climate change, encourage healthy behaviors, and regulate innovative technologies; therefore, it is critically important to enhance communication and public engagement efforts that foster trust and credibility, allowing publics and scientists to share their passions and hear each other’s perspectives.

9. Comparison of the proposed undergraduate certificate with similar programs at other universities, including the Regent’s universities.

As of today, none of the regent’s universities is offering a science communication certificate or classes specializing in science communication. Two of the peer land grant universities offer a BS, MS and PhD in science communication (U Wisconsin, Penn State). North Carolina State University is offering a minor in science communication that requires 15 credits of communication classes. The University of Illinois – Urbana offers a graduate level science communication certificate based on workshops and projects.

The proposed comprehensive science communication certificate is unique within the Regent’s and peer land grant universities.

10. Program requirements and procedures, including:
  a. prerequisites for prospective students;
     Complete English 250
  b. application and selection process;
     Any enrolled undergraduate student at ISU can enroll into the certificate as long as the prerequisites are met. There is no selection process.
  c. language requirements;
     None
  d. courses and seminars presently available for credit toward the program;

Core courses:
(2) PHIL 206: Introduction to Logic and Scientific Reasoning
(3) ENGL 312 Biological Communication
(4) JLMC 347 Science Communication

Electives:
Science in Practice
BIOL 173 Environmental Biology
BIOL 351 Biological Processes in the Environment
BIOL/WGS 307 Women in Science and Engineering (GE)
BIOL 355 Plants and People
ENVS 442 The Policy and Politics of Coastal Areas
ENSCI 250 Environmental Geography
ENSCI 360 Environmental Soil Science
ENSCI 384 Introduction to Ecosystems
GEOL 101 Environmental Geology: Earth in Crisis
GEOL 102 History of the Earth
GEOL 108 Introduction to Oceanography
GEOL 160 Water Resources of the World
GEOL 324 Energy and the Environment
GEOL 201 Geology for Engineers and Environmental Scientists
METEOR 404 Global Change
METEOR 406 World Climates
NREM 120 Introduction to Renewable Resources
NREM 380 Field Ecology Research and Teaching

Science and Society

WGS 320 Ecofeminism
WGS/HIST 380 History of Women in Science, Technology, and Medicine
WLC 484 Technology, Globalization and Culture
SOC 382 Environmental Sociology
SOC 464 Strategies for Community Engagement
ENGL 355 Literature and Environment (GE)
EDUC 347 Nature of Science (GE)
JLMC 474 Communication Technology and Social Change
JLMC 401 Mass Communication Theory
JLMC 476 World Communication Systems
HIST 362 Global Environmental History
HIST 367 America Eats
HIST 383 Technology, Public Science, and European Culture
HIST 482 Birth, Death, Medicine, and Disease
POL S 335 Science, Technology, and Public Policy
POL S 383 Environmental Politics and Policies
PHIL 331 Moral Problems in Medicine
PHIL 334 Environmental Ethics
PHIL 336 Bioethics and Biotechnology
PHIL 343 Philosophy of Technology
PHIL 380 Philosophy of Science
PHIL 389 Philosophy of Psychology and Psychiatry
PHIL 485 Philosophy of Physics

Communication in Practice

AGEDS 327 Survey of Agricultural and Scientific Communication
ENGL 309 Proposal and Report Writing
ENGL 314 Technical Communication
ENGL 332 Visual Communication of Quantitative Information
ENGL 350 Rhetorical Traditions (GE)
ENGL 411 Technology, Rhetoric, and Professional Communication
ENGL 477 Seminar in Technical Communication
ENGL 487 Internship in Business, Technical, and Professional Communication
LING 120 Computers and Language
NREM 330 Principles of Interpretation
PR 305 Publicity Methods
PR 220 Principles of Public Relations
PR 323X Strategic Communication in Agriculture and the Environment
SP CM 212 Fundamentals of Public Speaking
SP CM 310 Rhetorical Analysis
SP CM 322 Argumentation, Debate, and Critical Thinking
SP CM 327 Persuasion and Social Influence
SP CM 305 Language, Thought and Action

e. proposed new courses or modifications of existing courses;

Core course:
JLMC/PR/ADVRT 200-levelX Media Controversies in Science and the Environment
Elective:
GEOL 3XX (Class on experiment design, evaluation, and communication)

f. advising of certificate students;
   Advising through professional advisors. Steering committee members
   meet with professional advisors once per year to inform about changes
etc.

g. implications for related areas within the university.
   - By encouraging students to take classes in STEM, Humanities and
     Social Sciences has the potential to increase enrollment in classes and
     programs involved in this certificate. This program may also serve as a
     gateway for students to add a minor or second major in one of the
     collaborating programs.
   - The certificate will strengthen existing synergies and potential
     collaborations between faculty in adjacent programs (i.e., technical
     communication, communication studies, philosophy).
   - The certificate forms a curricular path for students interested in
     science communication.
   - The certificate will generate two new courses and lead to several
     name changes of existing courses.

11. General description of the resources currently available and future resource needs, in
    terms of:
    a. faculty members;
       No additional faculty needed, individual teaching loads will not
       significantly change.
    b. computers, laboratories, and other facilities;
       No additional space or facilities will be needed.
    c. library facilities (journals, documents, etc.) in the proposed area;
       No additional library facilities are needed.
    d. supplies, field work, student recruitment, etc.
       Two Fellowships for students interested in applied science
       communication are available from the Greenlee School (ComSHER
       Fellowship).
       No additional resources are required.

12. Describe the needs for new resources and/or reallocated resources. Attach to the
    program proposal memos from the department chair(s), the college dean(s), and other
appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.

No need for new resources is anticipated.

13. Attach to the program proposal, letters of support, recommendations, and statements when appropriate, from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program.

14. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.
Mission Statement

The science communication certificate provides an opportunity for students to develop their public communication skills, to interface with students and faculty across disciplinary and science-public divides, and to give students an edge in the job market. The Science Communication Certificate will provide evidence that the holder can successfully communicate scientific findings and ideas with a multitude of stakeholders.

Science Communication Certificate Steering Committee

Primary responsibilities for decisions regarding the certificate will be managed by the Science Communication Certificate Steering Committee. The Steering Committee will serve as the curriculum committee for this program and it will grant requests for internship and other experiences to count toward the certificate.

Responsibilities of the steering committee include but are not limited to:
- Initiate the process for approval of all changes to the certificate program
- Work directly to LAS advisors to promote the certificate program
- Oversee substitutions of courses required to complete the program
- Update the catalog to reflect changes to the certificate program and its requirements
- Provide information about the program to interested parties upon request
- Collect information related to the certificate program such as number of students, etc.

Membership of the Committee

The Steering Committee shall consist of four members and will include faculty from Social Sciences, Humanities, and STEM. Members will be appointed by their respective department chairs and the Dean of the College of Liberal Arts and Sciences and serve a term of maximum 3 years.

Program Advisor

Advising tasks will be handled by professional college of Liberal Arts and Sciences advisors. The advisor will be responsible for answering questions about the program, forwarding requests for internships etc., keeping track of enrollment in the program, and checking completion of requirements for graduating seniors.
Admission to the Program

To be admitted to the certificate, a student needs to be enrolled at Iowa State University. Student must have completed ENGL 250 before enrollment.

All requests for admission to the program will be initiated by the student by filing the standard ‘Request for Undergraduate Certificate’ form. The student will obtain the signature of their academic advisor who will forward the petition to the Program Advisor for approval.

Application of Internships and Individual Research Experiences towards the Certificate

Internships and research experiences should be designed to meet the requirements for a 3-credit class, with clear standards for completion and a comparable work load to a 3-credit graded course.

Changes to the Program

Major changes to the Certificate Program will normally be initiated by the Steering Committee. Changes approved by the Committee must then be approved the curriculum committee of the College of Liberal Arts and Sciences.

Changes to this Governance Document

Proposals to change this Governance Document can be initiated by the Science Communication Certificate Steering Committee and will be approved by the curriculum committee of the college of Liberal Arts and Sciences. A consensus of all parties will be required for the change to take effect.
To: Dara Wald, Assistant Professor, Greenlee School of Journalism and Communication  
From: Volker Hegelheimer, Chair, Department of English  
Date: March 17, 2021  
Re: Undergraduate Science Communication Certificate program proposal

As a land grant institution, Iowa State has consistently worked to create transdisciplinary opportunities to accomplish precisely what this Science Communication certificate is designed to foster--students and faculty putting research into practice that serves, and connects with, the broader public. The Science Communication certificate creates meaningful synthesis across STEM and communication-focused fields and allows students to produce public-facing projects that will give them tangible credentials and skills for their professional careers and work as engaged citizens. I strongly support this proposal.

The Department of English plays a significant role in this certificate with our English 312 as one of the four core courses and a significant number of our other courses included as electives. Our department's Director of Advanced Communication approves of this certificate and will be writing a letter of support, and the faculty who teach courses included in the certificate approve of this opportunity as well. The certificate strengthens our existing offerings in Technical Communication, Rhetoric, Speech Communication, and Literature.

Sincerely,

Volker Hegelheimer  
Chair, Department of English  
chair_engl@iastate.edu  
515-294-2282
Date: March 30, 2021

To: Dara Wald

From: Michael Dahlstrom; Director of the Greenlee School of Journalism and Communication

Re: Support for Certificate in Science Communication

The faculty and director of the Greenlee School of Journalism and Communication strongly support the creation of an interdisciplinary Certificate in Science Communication along the lines of your proposal. Science communication is a strength of the Greenlee School, with permanent science communication courses at the undergraduate and graduate levels as well as multiple faculty with research emphases in science communication.

We believe that a certificate in science communication that brings together the strengths of multiple Iowa State programs will be an attractive choice for students in the sciences as well as students in communication fields. We support this proposal to create the program.

Sincerely,

[Signature]

Dr. Michael Dahlstrom
Director
LAS Dean’s Professor
Greenlee School of Journalism and Communication
Iowa State University
April 9, 2021

To: Dara Wald, Assistant Professor, Greenlee School of Journalism and Communication
From: Jenny Aune, Director of Advanced Communication & faculty member in Rhetoric and Professional Communication
RE: Support for Undergraduate Science Communication Certificate

As Director of the Advanced Communication as well as a colleague in Rhetoric and Professional Communication (RPC) in the Department of English, I write in full support of the certificate in Science Communication. One of our courses in Advanced Communication (English 312) is a core course in this certificate, and a substantial number of the courses listed as electives are offered by my colleagues in RPC. On April 7, 13 of my colleagues in RPC had an area meeting, and the area expressed full support for this certificate, appreciating its clear benefits for students and for the RPC program, its interdisciplinarity, and its focus on public-facing communication.

This certificate exemplifies the work Advanced Communication has been expanding for years that connects communication with cross-disciplinary work, and I fully support its creation.

Sincerely,

Jenny Aune
Date: March 17, 2021

To: Dara Wald, Assistant Professor, Greenlee School of Journalism and Communication

From: Kristie Franz, Chair, Dept. of Geological & Atmospheric Sciences

RE: Undergraduate Science Communication Certificate program proposal

The Department of Geological & Atmospheric Sciences (GeAt) strongly supports this proposal to create an undergraduate Science Communication Certificate program. Developing effective communication skills is a core part of a scientist’s training. There is increasing demand across all sectors for scientists who can communicate to diverse audiences, and the Science Communication certification will be attractive to GeAt students interested in jobs with federal and state agencies, private consulting firms, and graduate school. Job postings for meteorological forecasting positions, for example, have long listed public communication skills as a requirement. Increasingly, the National Weather Service is emphasizing the need for skill in “risk communication”. GEAT has recently created an Interdisciplinary Studies in Climate Science degree pathway and is preparing to propose a new major in Climate Science. Science Communication will be an optional focus area in these Climate Science degree programs and the certificate will be a valuable credential for these majors.

This certificate program does not conflict with any major or minor degree programs offered by GeAt.

Sincerely,

Kristie J. Franz
Chair, Department of Geological & Atmospheric Sciences
kfranz@iastate.edu
(515) 294-1837
We have quite likely never seen times when there is stronger need for clear and effective science communication. We have, in the U.S., climate deniers, COVID deniers, anti-maskers, anti-vaxers, and fairly wide-based general distrust of science. It seems very clear that there is strong need for people who can bridge the considerable gap between science and the public, and it would appear that it takes special knowledge and understanding to reach the anti-science population. The proposed Science Communication certificate is a step in the direction of addressing some of the above and so I strongly support the proposal. The proposal has, I think, an appropriate mix of disciplines and the appropriate division between the social and the “hard” sciences.

Philosophy does play a significant role in the certificate and one of the four core courses is a philosophy course. The instructor for that course likes the proposal and is already thinking about how to adjust assignments so that they can be of further use to future certificate holders.

Overall, this seems to be a timely and useful program that I am very happy to support.
Academic Program Approval Voting Record

This document is to be appended as the last page of the proposal for any new or revised academic program to record the successive votes of approval as the proposal moves through its required review and approval steps. Consult Faculty Handbook Section 10.8 or the Faculty Senate Curriculum Committee website for information regarding Committee review and voting requirements for each action.

Curricular Action: (check appropriate boxes below)
1. X New Program □ Name Change □ Discontinuation □ Concurrent Degree for:
2. □ Undergraduate Major □ Graduate Major □ Undergraduate Minor □ Graduate Minor
   X Undergraduate Certificate □ Graduate Certificate □ Other: __________________________
3. Name of Proposed Change: ___Creation of the Science Communication Certificate (Undergrad)___
4. Name of Contact Person: Dara Wald e-mail address: dwald@iastate.edu

5. Primary College: LAS Secondary College: __________________
6. Involved Department(s): GSJC GEAT ENGL

Voting record for this curricular action:

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<th>Voting Body</th>
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<tr>
<td>Greenlee School of Journalism and Communication (GSJC)</td>
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<td>April 2, 2021</td>
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[FSCC – November 2013]