

GENERAL EDUCATION COURSE ENHANCEMENT GRANT COMPETITION 2018

1. **Principal Investigator Name(s) and Academic Title(s)** Challa Kumar, Professor of Chemistry

2. **Email Address(es)** Challa.Kumar@uconn.edu

3. **Is this a new course or a currently existing course?** An upgrade of an existing course.

4. **List the course title and course number of the proposed/enhanced course and name of the sponsoring department or program.**

Chem 3170W, Technical Communication, Department of Chemistry. If funded, course name may be changed to 'Science Writing' to broaden the scope, and it will be made portable for adoption by faculty from other departments and disciplines for offering at the undergraduate level. Theme of the course will be 'Environment and Sustainability' for illustration of specific course concepts and to create relevant writing assignments around this theme. This theme cuts across various science disciplines and there is a large body of published data which the students can research for their own analysis and ultimate dissemination in public research forums.

5. **Describe your project and the work that will be done during the grant period on course content, course design, and/or teaching approach. Provide a clear statement of the objectives of the project in terms of student learning.**

Objective of this project is to create a portable science writing course with the theme of environment/sustainability which can be adopted by other science faculty within or outside chemistry, across multiple science disciplines. For example, the book 'Scientific Writing and Communication' by Angelica Hofmann for Oxford University Press (2017) will be the guiding force. This book is ideally designed to cut across science disciplines and this project will transform this book into a writing course while the PI will develop appropriate instructional tools for other instructors to adopt for their own needs. The course materials prepared under this project (24 videos, 24 assignments, rubrics for grading, 24 lesson plans and 24 lessons pertaining to environmental chemistry, all copyright of the PI) will be shared free of charge to all science faculty. The materials will be on HuskyCT for quick adoption.

Course design: The course design was discussed with three other faculty, two from sciences and one from linguistics and they all showed immense enthusiasm in support of the course. The course will be organized into seven modules of 28 lectures of 75 minutes each (please see the full course outline, biweekly modules given below), and each lecture will have a 15 minute video for the students explaining the main goals and end points of each lecture. For example, 'Audience analysis' is an important concept of science writing and the corresponding lecture (M1L4) will cover details of this concept and activities that translate the lecture into assignments.

L: Lecture	A: Activity						
Weeks 1, 2	Weeks 3, 4	Weeks 5, 6	Weeks 7, 8	Weeks 9, 10	Weeks 11, 12	Weeks 13, 14	
M1 8/29-9/7	M2 9/12-9/21	M3 9/26-10/5	M4 10/10-10/19	M5 10/24-11/2	M6 11/7-11/16	M7 11/28-12/7	
L1 Intro to course	L1 Graphs	L1 Outline	L1 Results	L1 Conclusions	L1 Revising	L1 Oral 1	
A1 In-class assignment	A1 In-class assignment	A1 In-class assignnr	A1 In-class assignnr	A1 In-class assignnr	A1 In-class assignment	A1 In-class assignment	
L2 Principles of Writing	L2 Schemes	L2 Abstract	L2 Figures	L2 TOC Graphic	L2 Revising	L2 Oral 2	
A2 In-class assignment	A2 In-class assignment	A2 In-class assignnr	A2 In-class assignnr	A2 In-class assignnr	A2 In-class assignment	A2 In-class assignment	
L3 Literature Search	L3 Tables	L3 Introduction	L3 Equations	L3 Peer Review	L3 Speaking	L3 Oral 3	
A3 In-class assignment	A3 In-class assignment	A3 In-class assignnr	A3 In-class assignnr	A3 In-class assignnr	A3 In-class assignment	A3 In-class assignment	
L4 Audience Analysis	L4 Citations	L4 Experimental	L4 Discussion	L4 Rebuttal	L4 SlideShow	L4 Oral 4	
A4 In-class assignment	A4 In-class assignment	A4 In-class assignnr	A4 In-class assignnr	A4 In-class assignnr	A4 In-class assignment	A4 In-class assignment	

Specific assignments will be designed for each lecture (listed above) and these can be tailored to fit to the needs of the discipline/department/instructor. Assignments for Environmental Chemistry will be developed but the design will be such other faculty can adopt or change these to meet their needs. Some general assignments that cut across various disciplines will be provided so that instructors can readily use these assignments, if they choose to. More details are provided in the course content section.

These lectures are aligned with specific topics covered by the above book, and lectures 1 and 2 will cover Part 1 of the book mention above. Lectures 2 and 3 will cover Part 2 etc., but not all parts are covered because some content is for graduate level (Review papers/theses/grant proposals). However, the latter parts cover poster preparation and oral presentations which are included in this course content. Another important chapter in the book to be used is 'Job Applications and Interviews', which will be of added value to the undergraduate majors that will soon be joining the workforce.

Course Content: One challenge is to make the course adoptable by other faculty for teaching the concepts of science writing to undergraduate students from different science disciplines or different science majors. This part is

well handled in the above textbook by Hofmann, which is one major reason to pick this book. Each of the 24 lectures will have specific class notes covering the lecture, 15-minute video the student is required to watch before arriving in the class, and one in-class and one home assignment that the student will be asked to upload to HuskyCT. All assignments for chemistry (24) will be delivered and other faculty can either use some of these or replace all or some by their own assignments. The content will center around the ‘Scientific Argument’ which involves enunciation of the hypothesis or raising a valid question, evidence gathering and objective testing of the hypothesis or seeking the most logical answer to the question. In total, 24 class notes (4 of the class periods are for student presentations), 24 assignments, 24 pre-lecture videos and rubrics for grading will be delivered.

Teaching approach will be to inspire the student why writing is important in sciences and how science writing is different from non-technical writing. The PI believes ‘**Teaching is a true investment in our future**’ and to that end, he will strive to provide highest standards of writing by inspiring the students to practice writing that is cogent, concise and complete. *Writing is perhaps one of the most significant attributes of humans and we depend on writing for most of our day-to-day activities.* Science, in particular, depends heavily on clear, concise and complete writing of ideas, data, interpretations and discussions. The PI has authored nearly 175 peer-reviewed publications and 4 books and has writing experience over three decades. The major theme of the course is ‘Environment and Sustainability’ which is the theme of the year for GEOC for this competition. There is a very large body of data published and publicly available on this theme which the students will research to test specific hypotheses. Their research analysis will be converted into publishable research material during this course for dissemination in pertinent research forums as measurable outcomes.

6. [How do you intend to evaluate project objectives once the course, as proposed, is offered? Please identify intended learning outcomes and assessment tools.](#)

Assessment of the course success will be through surveys in HuskyCT as well as at the University level. The HuskyCT interim surveys will be useful to make modest adjustments to the course during the semester, while the summative surveys in HuskyCT and the university teaching evaluations will be useful for adjustments for the subsequent offerings of the course. Both will be used to gain maximum feedback and gauge course success. In addition, the following strategies will be applied.

Intended learning outcomes are at various levels (4) of competencies:

(1) enhance writing skills at the undergraduate level on focused science topics that are suitable for publication as short reviews in Undergraduate Research journals. There are more 200 journals in a large number of disciplines, almost all are run by universities across the US, including Harvard, the Ivy league and numerous state universities (https://www.cur.org/resources/students/undergraduate_journals/). There is large body of data that is constantly pouring in on the ‘Environment and Sustainability’ and student will analyze specific data sets on a sub-topic of their interest in this broad field and test particular known hypotheses. Successful testing of the hypotheses or need for additional data acquisition will be determined through careful analysis of the existing data. These aspects will form the focus for a 15-page article which will be peer-reviewed by the class/instructor and it will be revised twice. This final draft will be submitted for dissemination. If the student article is accepted for publication in one of the undergraduate research journals, that will be a specific learning outcome and many students (not all) are expected to achieve this level of outcome;

(2) students prepare and make oral presentations based on their research in the course, and top 3 students, as judged by the class and the instructor will be encouraged to submit their paper at the national undergraduate research symposium which is held annually by National Council of Undergraduate Research (NCUR). Acceptance of their work for oral presentation at the national symposium is another learning outcome (several organizations support student travel and other expenses to support this activity) but this learning outcome will be more limited to one or at the most two students that excel; and finally,

(3) students will be encouraged to make poster presentations at regional meetings in CT of various learned societies, such as American Chemical Society Connecticut-Valley Section, which organizes annual meetings in the Spring of each year, with no registration charge, and such acceptance for poster presentations will be another level of learning outcome and assessment. This last event is in the Spring but Fall courses will need to wait to benefit from this assessment tool.

(4) All students will be required to author a multi-media e-Book on their chosen topic with text, graphics, audio and a short video clip (30 seconds) and make it available at the iTunes University or at alternate public forums. The student-book author will be encouraged to disseminate the book at multiple forums.

Thus, four different learning outcomes and their corresponding measurables will assess course success.

7. Describe how the course will fit into [UConn's General Education](#) curriculum. (The General Education guidelines can be found at: <http://geoc.uconn.edu/geoc-guidelines/>) How will the course serve the [broad goals](#) of UConn's General Education program (flexibility in thinking, foundations for learning at UConn and later in life, critical analytical skills, etc.)?

This upgrade of the current course is necessary to implement and achieve GEOC goals for undergraduate writing with 'Environment and sustainability' theme. Students will take learning and dissemination beyond the class room and integrate their experience from the class room to their learning communities. The oral presentations at the national symposia, local symposia and poster presentations will engage the larger community and train students on how to articulate environmental issues with their peers and others in the field. Thus, teaching and learning will be extended beyond the class room with emphasis on environment and sustainability issues, which are urgent unmet challenges. This course will enhance flexibility in thinking by examining various points of view, large data sets and provide a strong foundation for environmental stewardship for future generations. The data analysis required in the course will augment and enforce critical analytical skills for constructing complete, correct and logical arguments.

8. For which [content areas \(CA1-4\)](#) and/or [competencies \(W, Q\)](#) will the course be proposed and how will it address the [specific criteria](#) for courses in these content areas and/or competencies? [NOTE: Please review the Gen Ed criteria for your proposed content area(s) or competency(ies) carefully.

W – writing course, 3 drafts of 15 pages each with feed back to the student on how to improve their science writing. They will be required to assemble the material into a multi-media e-Book featuring text, graphics, audio and short video clips. There will be active and prompt feed back to students through 24 assignments, one per lecture. These will be designed to enhance the analytical skills of students while promoting clear writing. There will be peer review training and successful revising of the drafts while addressing the reviewer comments. Each student will review 2 other student's work which will provide valuable experience of how to critique and review other's work.

9. How will the course [add to and/or enhance existing course offerings](#)? Which of the areas targeted by this year's competition does it address? Does it fill other important gaps? How does it compare to current offerings or pedagogy? What will be distinctive about the course?

The course will emphasize science writing at the undergraduate level with the current GEOC theme of 'Environment and Sustainability' and the entire course content will be designed for quick adoption by other instructors from chemistry or other disciplines, placed on HuskyCT. This allows for quick revision and adoption by others who wish to teach this course, elsewhere in CLAS, with their own foci and this will be one of the major distinctions of this course. Another distinction is student participation outside the class room which is one of the required learning outcomes and this can be presentation (oral/poster) at a national/regional conference, or publication of their work in one of the undergraduate journal at the national level or a e-book published on iTunes University. These specific endpoints define the learning outcomes as well as the assessments and point out uniqueness of this course. The interdisciplinary theme 'Environment and Sustainability' will be the high light which is readily adoptable into particular content area in specific fields of science such as Environmental Biology, Environmental Physics, Environmental Chemistry, etc., These unique attributes deserve funding for this innovative writing course.

10. How will your course serve as a [model](#) to assist others in their efforts to improve the general education curriculum?

A general platform will be created for adoption by other faculty in Chemistry and other science departments with the general theme of 'Environment and Sustainability' the theme of this year's GEOC competition. This theme also serves well the key idea of this course that is, it will be applicable across multiple science disciplines, as explained above. Key aspects of the course can be readily adopted across various science disciplines and with appropriate adjustments to assignments, quizzes and questions other faculty can offer this course in their respective departments with their own sub-themes. In other words, the course will be 'Portable' and will be made available free of charge to any of these faculty members who intend to teach this course at least once. Thus, this course is expected to serve as a model for the development of other science writing courses in other departments of CLAS.

11. Is your proposal [linked](#) to any others being submitted in this competition? No

12. Has this course even been submitted for this grant in the past? No

13. Has this course been FUNDED by this grant in the past? No