



## **CIEE Global Institute – Monteverde**

<b>Course name:</b>	Science Writing and Communication
<b>Course number:</b>	(GI) COMP 2001 MOCR
<b>Programs offering course:</b>	Monteverde Open Campus Block: STEM and Society
<b>Open Campus track:</b>	STEM and Society
<b>Language of instruction:</b>	English
<b>U.S. Semester Credits:</b>	3
<b>Contact Hours:</b>	45 hours
<b>Term:</b>	Fall 2019

### **Course Description**

Students will express science goals, methods, findings and conclusions in a variety of contexts, including academic, governmental, nonfiction and popular. Students will study academic documents, such as abstracts, research proposals, and journal articles, and will analyze disciplinary writing practices. Students will take data and learn the most effective ways of expressing their trends and conclusions drawn from them for a peer-reviewed journal. Likewise, students will explore ways to summarize data and present them in poster format and as a symposium talk to a scientific audience, as would happen at a scientific conference. Students will compare academic writing and communication standards to those of the U.S. government, including how science informs policy. Students will then take scientific findings and express them for general audiences in writing, orally and using social media. In doing so, students discover that successful communication to the public relies on the audience, the writer, context and medium. Students will generate and research article ideas, interview scientists, and translate complex scientific and technological developments into clear and engaging stories for the public.

### **Learning Objectives**

By the end of this course students will,

- Establish a strong foundation of grammatically correct and concise writing
- Search for and recognize effective science writing, examples of engaging oral communication and compelling use of other media
- Understand the importance of a scientifically literate populace, including in the developing world
- Develop tools to critically analyze effective science communication in a variety of contexts, including academia, government and popular scientific writing, as well as other forms of communication
- Show competency in planning, researching, outlining and delivering a scientific proposal, scientific manuscript, conference poster and symposium talk
- Apply science communication to foster learning and promote inclusivity in the context of science education
- Appreciate how culture impacts science and science communication
- Demonstrate competency in understanding science and making it accessible to others, including other cultures



- Effectively research and use current science to promote a greater public understanding of current science-based issues facing society
- Integrate technology to maximize effectiveness of science communication to scientific, governmental and popular populations

### **Course Prerequisites**

None

### **Methods of Instruction**

Writing, lectures, discussions, critique, research, individual and group presentations, readings and interviews with local scientists will all be used to teach this course. Students will use online resources to find and critique examples of effective science writing and communication. Using these as point of departure, students will produce a scientific proposal, manuscript, poster and symposium talk. Classroom activities will involve group projects and critical discussion groups considering best practices and effectiveness for scientific communication. Students will research and compare academic communication with norms used by U.S. government agencies. They will critique and create science communication for a popular audience in writing, orally and using social media. Students will critically evaluate the role of culture in effective science communication, as well, by comparing popular science accounts from local media.

### **Assessment and Final Grade**

List at least four methods of assessment in addition to attendance and participation, indicating the percent of final grade below totaling 100%:

1. Writing Style Worksheet	5%	
2. Scientific Proposal	10%	
3. Scientific Manuscript	15%	
4. Science Symposium Poster	10%	
5. Science Symposium Talk	10%	
6. Government White Paper	5%	
7. Nonfiction Essay	10%	
8. Popular Article		10%
9. Social Media	5%	
10. Participation	20%	
Total	100%	

### **Writing Style Worksheet**

Students will be asked to write a 500 word essay on a science topic of their choice. Then, students will investigate, critique and use grammar and writing guides to distill their top 10 challenges to improve their own writing. They will rewrite their original essay, addressing their personal challenges. They will also take a grammar assessment and will work with the instructor to address unforeseen challenges they have to improve their writing.



### **Scientific Proposal**

Students will review science proposal guidelines, choose an example proposal and critique its effectiveness. They will then write a 500 word proposal of their own, following standard guidelines for scientific research proposals. This will include a review of pertinent scientific literature. Students will be graded on format, style, use of literature, justification of the proposed study question, clarity of experimental design and anticipated results.

### **Scientific Manuscript**

Students in groups of three will carefully deconstruct three scientific papers: one they feel is well-written, one that they feel is poorly written and one that is assigned by the instructor. After careful consideration, students will re-write the instructor-assigned or poorly-written manuscript. Students will be graded on how much they improved the clarity of the original manuscript while staying within the norms of academic science writing.

### **Science Symposium Poster**

Students will see examples of more and less effective posters presented at scientific conferences. They will critique what worked and what did not. Students will then speak to local biologists about their experiences delivering posters at scientific conferences. Students will then choose a study using online resources and translate it to a poster. They will explain elements of the poster, compare their poster to those of other students and assess how their poster could be improved.

### **Science Symposium Talk**

The instructor will show examples of three different talks from scientific meetings. Students will meet with two local scientists who will relate experiences giving successful and less successful talks at scientific meetings. Students will then find a study online and construct a ten minute Powerpoint talk and deliver it to the rest of the class. Students will be graded on how well the science was conveyed orally to a group of scientists.

### **Government White Paper**

Students in groups of three will read at least three U.S. government white papers dealing with a science topic of their choosing. use a U.S. government template to write a 1000 word white paper on a science topic of their choosing. Students will compare audiences, as well as differences in writing style, content and context, with academic science writing.

### **Nonfiction Essay**

Students will read at least three nonfiction science essays that are written for a general audience. One of these will be assigned by the instructor and the others will be chosen by the student. Students will critique each nonfiction essay. They will then choose a historic science topic and summarize its history and science in a 750 word essay for an educated by non-specialized audience.



### **Popular Article**

Students will find and critique at least five popular science articles dealing with science. They will consider what is effective and what is not working. They will then write their own 500 word article for a popular audience.

### **Social Media**

Students will work in groups to make a meme, short video and social media post on a current scientific topic. They will create a blog post on the same topic and, using what they have created, post it the CIEE website.

### **Participation**

Participation is valued as meaningful contribution in the digital and tangible classroom, utilizing the resources and materials presented to students as part of the course. Meaningful contribution requires students to be prepared in advance of each class session and to have regular attendance. Students must clearly demonstrate they have engaged with the materials as directed, for example, through classroom discussions, online discussion boards, peer-to- peer feedback (after presentations), interaction with guest speakers, and attentiveness on co- curricular and outside-of-classroom activities.

### **Class Attendance**

Regular class attendance is required throughout the program, and all unexcused absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus programs, unexcused absences that constitute more than 10% of the total course will result in a written warning.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent. Attendance policies also apply to any required co-curricular class excursion or event, as well as to Internship, Service Learning, or required field placement. Students who miss class for personal travel, including unforeseen delays that arise as a result of personal travel, will be marked as absent and unexcused. No make-up or re-sit opportunity will be provided.

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Unexcused absences will lead to the following penalties:

<i>Percentage of Total Course Hours Missed</i>	<i>Equivalent Number of Open Campus Semester classes</i>	<i>Minimum Penalty</i>
Up to 10%	1 content classes, or up to 2 language classes	Participation graded as per class requirements



10 – 20%	2 content classes, or 3-4 language classes	Participation graded as per class requirements; <b>written warning</b>
More than 20%	3 content classes, or 5 language classes	Automatic <b>course failure</b> , and possible expulsion

## Weekly Schedule

NOTE: this schedule is subject to change at the discretion of the instructor to take advantage of current experiential learning opportunities.

### **Week 1**

#### Good Writing and Effective Communication

Session 1. Students will be asked to write a 500 word essay on a science topic of their choice. Then, students will investigate, critique and use grammar and writing guides to distill their top 10 challenges to improve their own writing. They will rewrite their original essay, addressing their personal challenges. They will also take a grammar assessment and will work with the instructor to address unforeseen challenges they have to improve their writing

Readings: Unit 1, Communicating as a Scientist. 2010. Doumont, J., ed. *English Communication for Scientists*. Cambridge, MA: NPG Education. <https://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/communicating-as-a-scientist-14238273>

Due: Writing Style Worksheet, 10 personal writing challenges, grammar assessment

### **Week 2**

#### Summarizing and Packaging Data

Session 2.1 Students will review how to summarize and present data. They will review the scientific literature and see how data are normally presented in figures and tables.

Readings: In, J. and Lee, S., 2017. Statistical data presentation. *Korean journal of anesthesiology*, 70(3), pp.267-276.

Session 2.2 Students will work with assigned data sets and use Excel to find the most effective ways to present data to a scientific audience. They will then consider how presentation of data might have to change to present the same data to a popular audience.



Readings: Making Data Meaningful, Parts 1 and 2. 2011. United Nations Economic Commission for Europe.  
<https://www.unece.org/stats/documents/writing/>

Due: Rewritten Essay from Week 1

### **Week 3**

Academic Science Writing: Proposals and Manuscripts

Session 3.1 Writing a Scientific Proposal. Students will review science proposal guidelines, choose an example proposal and critique its effectiveness. They will then write a 500 word scientific proposal of their own, following standard guidelines for scientific research proposals. This will include a review of pertinent scientific literature. Students will be graded on format, style, use of literature, justification of the proposed study question, clarity of experimental design and anticipated results.

Readings: Sample Proposals  
[http://www.urop.uci.edu/SURP/surp\\_sample\\_proposals.html](http://www.urop.uci.edu/SURP/surp_sample_proposals.html)

Session 3.2 Writing a Scientific Manuscript. Students in groups of three will carefully deconstruct three scientific papers: one they feel is well-written, one that they feel is poorly written and one that is assigned by the instructor. After careful consideration, students will re-write the instructor-assigned or poorly-written manuscript. Students will be graded on how much they improved the clarity of the original manuscript while staying within the norms of academic science writing.

Readings: Two peer-reviewed scientific papers of the student's interest and one assigned by the instructor.

Due: Scientific Proposal

Session 3.3 Science Manuscript Writing Workshop. Students will continue to hone their version of a scientific manuscript with help from the instructor.

Due: Rewritten Scientific Manuscript

### **Week 4**

Science Symposium Talk, Government White Papers



Session 4.1 Making a Science Symposium Poster. Students will see examples of more and less effective posters presented at scientific conferences. They will critique what worked and what did not. Students will then speak to local biologists about their experiences delivering posters at scientific conferences. Students will then choose a study using online resources and translate it to a poster. They will explain elements of the poster, compare their poster to those of other students and assess how their poster could be improved.

Readings: How to Create a Research Poster. 2018. NYU Libraries. <https://guides.nyu.edu/posters>

Due: Finished Poster

Session 4.2 Poster Presentation and Critique. Students will present their posters to the rest of the group and visiting biologists. They will explain their posters. Biologists will critique and judge the posters, offering suggestions for how they might be improved.

Homework: Students will go to the Monteverde Institute and the Monteverde Cloud Forest Preserve to see their current scientific posters and critique them.

Session 4.3 Making a Science Symposium Talk. The instructor will show examples of three different talks from scientific meetings. Students will meet with two local scientists who will relate experiences giving successful and less successful talks at scientific meetings. Students will then find a study online and construct a ten minute Powerpoint talk and deliver it to the rest of the class. Students will be graded on how well the science was conveyed orally to a group of scientists.

Readings: Larkin, M. 2015. How to give a dynamic scientific presentation. Elsevier <https://www.elsevier.com/connect/how-to-give-a-dynamic-scientific-presentation>

Due: Completed Symposium Talk in Powerpoint format

## **Week 5**

Nonfiction Science Writing, the TED talk, Popular Science Communication

Session 5.1 Science Symposium. Students will deliver their symposium talks to each other and invited scientists. Afterward,



the instructor and invited speakers will give constructive criticism on what worked and how to improve what did not.

Homework: Critique a scientific conference talk found online

Session 5.2 Nonfiction Science Writing. Students will read at least three nonfiction science essays that are written for a general audience. One of these will be assigned by the instructor and the others will be chosen by the student. Students will critique each nonfiction essay. They will then choose a historic science topic and summarize its history and science in a 750 word essay for an educated by non-specialized audience.

Readings: Two nonfiction science essays of the student's interest and one assigned by the instructor. Nijhuis, M. 2016. The Science Writer's Essay Handbook: How to Craft Compelling Stories in Any Medium. Amazon Digital Services.

Due: Nonfiction science essay

Session 5.3 The TED talk. Students will use the internet to explore different TED talks that deal with science topics. They will critique content and style and come up with a list of TED talk basics as recommendations for constructing an effect TED talk. Students will also critique how TED talks delivered by people of different cultures differ.

Readings: The 7 Steps to Delivering a Mind-blowing TED talk  
<https://www.fastcompany.com/3022070/the-7-steps-to-delivering-a-mind-blowing-ted-talk>

Due: TED talk basic recommendations

## Week 6

Popular Science and Social Media

Session 6.1 Popular Science. Students will find and critique at least five popular science articles dealing with science. They will consider what is effective and what is not working. Students will discuss the social contract between science and society. They will explore why a sector of the U.S. population often distrusts science on important topics, like climate change and vaccinations. Students will interact with Costa Rican Monteverde community members to assess their relationship with science information.

Readings: Sample Proposals  
[http://www.urop.uci.edu/SURP/surp\\_sample\\_proposals.html](http://www.urop.uci.edu/SURP/surp_sample_proposals.html)



Due: 500 word science article for a popular audience.

Session 5.2 Science in Social Media. Students will explore the role of social media in sharing important scientific information with a larger and often younger audience. Students will work in groups to make a meme, short video and social media post on a current scientific topic. They will create a blog post on the same topic and, using what they have created, post it the CIEE website.

Readings: Two peer-reviewed scientific papers of the student's interest and one assigned by the instructor.

Due: Meme, short video and CIEE blog post on science theme

Session 3.3 How to Improve Science Communication with the Public. Students, instructors and invited scientists will share their ideas for how science communication with the general public can be more effective. Students will also reflect on the role age and culture play in effective science communication with the public.

Readings: Nisbet, M.C. 2012. Re-defining science communication: emerging best practices that empower the public.

<http://bigthink.com/age-of-engagement/re-defining-science-communication-emerging-best-practices-that-empower-the-public>

and Nisbet, M., Hixon, M., Moore, K., & Nelson, M. (2010). Four cultures: new synergies for engaging society on climate change *Frontiers in Ecology and the Environment*, 8 (6), 329-331

## **Course Materials**

### ***Readings***

Doumont, J. ed. 2010. Communicating as a Scientist. English Communication for Scientists. Cambridge, MA: NPG Education.

Larkin, M. 2015. How to give a dynamic scientific presentation. Elsevier  
<https://www.elsevier.com/connect/how-to-give-a-dynamic-scientific-presentation>

In, J. and Lee, S., 2017. Statistical data presentation. *Korean journal of anesthesiology*, 70(3), pp.267-276

Making Data Meaningful, Parts 1 and 2. 2011. United Nations Economic Commission for Europe.



Nijhuis, M. 2016. *The Science Writer's Essay Handbook: How to Craft Compelling Stories in Any Medium*. Amazon Digital Services

Nisbet, M., Hixon, M., Moore, K., & Nelson, M. (2010). Four cultures: new synergies for engaging society on climate change *Frontiers in Ecology and the Environment*, 8 (6), 329-331

### **Online Resources**

Larkin, M. 2015. How to give a dynamic scientific presentation. Elsevier  
<https://www.elsevier.com/connect/how-to-give-a-dynamic-scientific-presentation>

Loder, N. 2002. So You Want to be a Science Writer? Association of British Science Writers <http://www.absw.org.uk/Documents/SYWTBASW.pdf>

Sample Proposals [http://www.urop.uci.edu/SURP/surp\\_sample\\_proposals.html](http://www.urop.uci.edu/SURP/surp_sample_proposals.html)

U.S. Federal Style Manual. 2016. <https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf>

U.S. Technology Innovation Program. 2010. National Institute of Standards and Technology, U.S. Department of Commerce  
[https://www.nist.gov/sites/default/files/documents/tip/wp/guide\\_for\\_white\\_papers.pdf](https://www.nist.gov/sites/default/files/documents/tip/wp/guide_for_white_papers.pdf)