**Communicating Ocean Science BISC 587 Spring 2022 (Draft)**

**Official Instructors:**

Dr. Jessica Parr [parr@usc.edu](mailto:paar@usc.edu) (16614) SGM 304

California Science Center Curator of Ecology and Life Science Chuck Kopczak, Aquarium of the Pacific Senior Manager of Education Emily Yam, James Fawcett (USC Sea Grant-transferring research to policy), Myrna Jacobson Meyers (COSIA teacher and Biogeochemist), DJ Kast (wonderkids coordinator, [Joint Educational Project (JEP)](https://dornsife.usc.edu/joint-educational-project/), Forbes 30 under 30 award and many other USC honors), Lynn Whitley (Director of Pre-College Education USC Wrigley Institute), Holly Willis (Chair of Media Arts and Practice division and Director of Academic Programs at USC Institute of multimedia), Warren Lewis(active film producer, screenwriter), Linda Chilton (Education coordinator for USC Sea Grant), David Medzerian (Sr. editor, digital media Annenberg School for Communication and Journalism), Jan Perry (General manager, City of Los Angeles) are some of the contributing instructors to this course.

**Course Description:**

Multi-instructor, interdisciplinary course focused on student awareness and improvement of cognitive processes used in research development, and best practices in communication of ocean literacy in the public sector.

**Units:** 4 semester units

**Prerequisites:** Graduate level understanding of scientific principles. Other interested upper division students can petition the instructor for admittance on an individual basis.

**Overall Schedule:**

Class will meet Monday and Wensday afternoons 12-1:50 PM, primarily upstairs AHF 259 conference room, and also at other venues such as the California Science Center (CSC), USC multimedia center, and the Aquarium of the Pacific (AOP, for presentations and observations). Each student will schedule additional 15 hours over the course of the semester for observing and presentations at one or both museum venues.

**Grading: (letter grade)**

Participation – 10%

Reading materials will be given to students prior to class. Students will guide the class in review of articles using blackboard tools. Participation will include blackboard as well as in class discussions and attendance.

Teaching Practicum – 35%

Teaching to informal audiences at the Aquarium of the Pacific or California Science Center.

This is a 15-hour commitment outside of class time.

Written Assignments – 35%

Blackboard homework discussions

Development of a lesson or presentation that can be taught in a local aquarium or presentations to other informal or formal group (15%), including:

Lesson or research idea proposals

Written lesson/presentation plan

Lesson debrief

Assessment tool or rubric (15%)

Written participation in Blackboard discussions on articles (5%)

Presentation – 20%

Oral presentation of presentation to class

Review of a peer’s presentation

**Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

**Statement on Academic Integrity**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

**Course Introduction and Objectives**

COSIA is a nationwide program focused on developing scientific literacy, acting through a formal national network of educators and scientists participating in this teaching/learning initiative. The proposed course is designed for graduate students in the Marine and Environmental Biology Section of the Department of Biological Sciences, Environmental Studies program,graduate students in other fields with experience and/or fundamental knowledge science processes. We have also expanded the course to include other disciplines of science as well as to include the makers of communication instruments for learning such as gamers, and animators. Any level student may petition for entry into the course.

The objectives of this course are to improve the ability of advanced science students to communicate their scientific knowledge to informal and formal audiences as well as to bridge interaction between disciplines of scientists and communicators. An additional objective is to teach scientists consciousness related to how they codify research concepts, with a goal of improving the quality of their approach to scientific ideas. The curriculum facilitates these objectives using learner centered and learning by doing philosophies. Students, using their own scientific research ideas, and working with university professors and educators, will participate in, and design an activity to be implemented at an informal learning institution. In addition, students, with guidance from outside experts including the Rossier School of Education, the School of Journalism, and the Institute for Multimedia Literacy, National Geographic Society, will learn about evaluation techniques, develop appropriate short presentations (elevator talks) to address various audiences, learn how to present concepts to journalists, and learn the basics involved in combining animation and inter-media learning tools with scientific concepts to enhance communication of science to non-science and informal audiences. The course will combine instruction in inquiry-based science teaching methods with 15 hours of supervised teaching ocean sciences at the Aquarium of the Pacific in Long Beach and or the California Science Center in Los Angeles.

Students will make presentations during the class in the Aquarium of the Pacific and/or California Science Center as well as a planned communication show-case on campus. These presentations will be on research topics of their choice and will provide guidance to the class on background journal readings before their presentations. Presentations will be described in class.

Each week, one student will compile, from blackboard discussions, the journal articles assigned for the week, which are chosen from current peer review journals. Each student will present 3 articles on blackboard for review by the class.

References for readings, coordinated to weekly sessions are below, found after the syllabus. PDFs will be made available to students on the Blackboard. Student references associated with personal research will be added to blackboard as the projects develop.

**Required Texts and Articles:**

**Note: we have articles available to you on line on the blackboard. Please come by and see the additional books in Dr. Myrna Jacobson Meyers’ office 143 AHF. The articles will be posted on the Blackboard page.**

**Following required books are found on the web and are free.**

**TITLE: Surrounded by Science: Learning Science in Informal Environments**

CITATION: Fenichel, M., and Schweingruber, H.A. (2010). Surrounded by Science: Learning Science in Informal Environments. Board on Science Education, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

ONLINE: [**http://www.nap.edu/catalog/12614/surrounded-by-science-learning-science-in-informal-environments**](https://urldefense.proofpoint.com/v2/url?u=http-3A__www.nap.edu_catalog_12614_surrounded-2Dby-2Dscience-2Dlearning-2Dscience-2Din-2Dinformal-2Denvironments&d=DQMFAg&c=clK7kQUTWtAVEOVIgvi0NU5BOUHhpN0H8p7CSfnc_gI&r=MlxcBLnslFRcjJ7_zZWKaA&m=UJpDGE7JE9rZpX1A8N3yNUFjeyH6N2Un4uAMDLsoT0Q&s=S3aGl36o-nHjO8L4NM_wOthmDKNBcsCZ53-xG1cIE6E&e=)

**TITLE: Ready, Set, SCIENCE! Putting Research to Work in K-8 Science Classrooms.**

CITATION: Michaels, S., Shouse, A.W., and Schweingruber, H.A. (2008). Ready, Set, Science! Putting Research toWork in K-8 Science Classrooms. Board on Science Education, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

ONLINE: <http://www.nap.edu/catalog/11882/ready-set-science-putting-research-to-work-in-k-8>

Reference texts we might suggest are found in the library as well or on line. Specific scientific information is found in books, on the web and /or will be provided. Homework posted at each session is material to be known for the session following the homework.

Selected articles on scientific topics based on student research-posted on blackboard.

**These articles are listed at the end of the syllabus.**

**P= project**

**E= elevator**

\*=Invited guest lecture

**Session Details \* = special guest Lecturer will be presenting on this day (not that the other people invited to join in this course are not special ☺)**

Scheduling changes may be necessary as the course proceeds and will be announced in class.

**Note**: Assigned readings and on-line discussions must be completed before class each week.The student leading a blackboard discussion will compile on-line student comments and present them for discussion in 7 minute session at the beginning of class**.**

**Before Session 1 Homework:**

Session 1 reading is posted; please read before class to students by email # 17 and 33 on this list.

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**Session 1. 1/1- An Introduction to the Toolbox of Learning and Communication.**

Introduction and logistics of the course, who are we, what do we expect etc. Discussion in class: we will review homework readings due. Intro of how we do this course. Location:AHF259 . Homework DUE NEXT SESSION: On Blackboard, discussion of articles listed below. Read articles, answer prompt. One student leader will compile answers to present in the first 5 min of class. This will be a graded exercise both for presenter and participants on Blackboard. Discussion leaders will be selected randomly and will rotate through all students in class. Articles to read # 2, 42, 12.

Leaders: Myrna ,Jessica

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**Session 2. 1/12** **Theory development and challenge:** The **Nature and Practice of Science**. What is Science, What is not Science, What Seems like Science and is not? Hands on games facilitate the class (MT). Location – JG .Through interactive presentation and game (Sorting Strips, Mystery Tubes) students will inspect the philosophical underpinnings related to how we define science in our society. Homework: Article 25, 49. Surrounded By Science, chapter 2 (p 19 – 34). Blackboard discussions of questions compiled by leader.

Leaders: Myrna, Jessica

**Session 3**

**NOTE Martin Luther King Day is 1/17 no class that Monday**

**Wed. 1/19 Theory development and challenge: Teaching and Learning** Styles of Communication:  Go to the Aquarium or to the California Science Center to observe learning in an informal learning space for at least **an hour**. Write down what you see: people interacting with exhibits, people interacting within a group, and people interacting with a facilitator (staff member). This may include learners interacting with objects, with people, and with animals. Location – CSC or AOP. Class will not meet in person; this is your time to make observations. If you visit AOP, please contact Emily ([eyam@lbaop.org](mailto:eyam@lbaop.org)) ahead of time so they can arrange for your admission. Admission to CSC is free. We will debrief this activity during the next class period.

Homework: Surrounded by Science, Chapters 3-4 (p 37-80).

Leaders: Jessica Myrna

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**Session 4. 1/24Setting the Stage: Learning Outcomes and Metrics**. Debrief last week’s assignment, where you observed learning in informal science centers. Continue with discussion of observable behaviors, learning outcomes, metrics, and tools needed to facilitate learning through “mountain building” exercise.

Location: JG. Homework: Ready, Set, SCIENCE! Chapter 5 (pages 87-108) Leaders: TBD

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**Session 5.** **1/26**  **Theory development and challenge:** **Teaching and Learning.** Styles of Communicating in Lecture, Useful Methods. How can we best present content rich information to various audience types? How can I tell if the audience understands? (“questions and conversations “Skits, role play activity will address a few modes of learning.) Location: JG, Homework: Articles #3, Ready, Set, SCIENCE! Chapter 7 (pages 127-148).

Leaders: TBD

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**Session 6. 1/31** **Theory development and challenge:** **Teaching and Learning. G**enerated by professionals at the Lawrence Hall of Science,  inquiry-based “play” station (using ice cubes) is used to discuss how we access prior knowledge and learn. Location: JG. Homework: Note activity design template on Blackboard. (P2) Article # 16, 12 give out the Jellies summative Monterey Bay Aquarium for Activity Design

Leaders: Myrna gives out jellies

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**\*Session 7.** **2/2** **Theory development and challenge :** Guest Lecturer: DJ Kast **Activity Design, Experimental Design** Designing a presentation, designing an activity, designing an experiment, designing a research topic.

Location: JG. Homework Article #14

Leaders: DJ Kast

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**Session 8.** **2/7**  **Theory development and challenge:** **Constructivism- Building knowledge**. This session focuses on how learners build an understanding of the world of them, the role of prior knowledge in building understanding, and the implications of these ideas of how we teach. Activity – moon balls and FILM. Location USC Torrey Webb Room (TWR) Homework: View and discuss the movie “A Private Universe“which will be posted on the Blackboard (also located here: [https://www.learner.org/resources/series28.html#](https://www.learner.org/resources/series28.html)). Discuss how people build knowledge and hold on to these conceptions. Homework: Online-Discuss Video, think about your projects. Surrounded By Science, chapter 1 (p 1 - 18). (P3)

Leaders: Myrna Jessica

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**Session 9.** **2/9 Theory development and challenge:** **Inquiring Minds**. Location: JG. Then begin workshop projects together application of learning thinking. Movie Minds of our own, lesson from thin air. The Inquiring minds. Homework:–Articles 48, 38, Intro to how people learn p.3-31 (P4) the right question at the right time.

Leaders TBD

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**Session 10. 2/14 Theory development and challenge:** **Learning Conversations.** This session focuses on conversations and questions, and the key role they play in facilitating and meaning-making of ideas and concepts for learners. We’ll be examining questioning strategies, patterns of talk. Then we’ll introduce elevator talks by hearing from the Turbo Entabulator. Location: JG Homework: articles #36, 37, 45

Leaders: Myrna

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**Session 11. 2/16** **Theory development and challenge:**  **Brain and Behavior Educational theory and the Brain**. In this session, we’ll learn more about how physiology and learning connect through brain behavior. We will discuss the read articles from the Wall Street Journal editorial page, and discuss emotional vs rational presentations and learning. Emotion, Visual system, etc.

Location: JG Leader: Myrna

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**\*Session 12.**  **2/21 is Presidents day no class so next class will be 2/23 Applications and Practice: Tools.** Concept mapping: tools for research, thinking, writing, and speaking. Concept mapping allows communicators to graphically show and understand how specific concepts connect with one another as you prepare to discuss these ideas with different audiences. Location: JG. Leader: Lynn Whitley guest lecturer. Homework: TBD

Location: JG. Leader: Lynn Whitley guest lecturer.

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**\*Session 13. 2/28 Applications and Practice: Holly Willis** **guest lecturer** of Interactive Media Lab. Homework: First ideas of presentation proposal due to collect and to discuss in session 12.

Location-USC IML. Multimedia tools - U Tube, Second life, Web page design, Inter media Department. Focusing on U Tube and other communication media, we will begin to create Design projects related to our research, web pages etc. Holly Willis, of IML will be guiding us as well as showing us a range of projects that embody scholarly multimedia

Homework: Prepare a one-page description of your project idea. Include: learning goals, materials you’ll need, and a short description of an activity that you might use to engage people.

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**Session 14. 3/2 Applications and Practice: Tools. Exhibit design, development, and evaluation.** How do we properly design etc and evaluate success? Why are games used in STEM learning? A critical conversation In this interactive presentation, we will examine why games are being increasingly leveraged in the education sector, and identify criteria for the effective use of this games for STEM learning and engagement. Homework Chuck Kopczak assigns, if not work on project Location: JG Homework: <http://penny-arcade.com/patv/episode/gamifying-education>

http://www.youtube.com/watch?v=falHoOEUFz0 BORN TO LEARN

Article 46

Leader: Chuck Kopczak, California Science Center.

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**Session 15**. **3/7 Applications and Practice: Workshop Activities.** We will spend time workshopping your proposed projects in class. Please come prepared with rapid prototypes, etc. so that we can talk through your ideas.

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**\*\*Session 16. 3/9** **Applications and Practice: Public speaking** / venues for speaking **Iris Maybrook** or Toastmasters or one hour each. Homework: review elevator talks. Location: JG Homework: Development of “elevator talks” to practice next class during class give out outline.

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**\*Session 17**. **3/14 – 3/16 Spring break no classes . 3/21 Applications and Practice: Applications and Practice: Storytelling and Communication.** Invited guest Lecturer Warren Lewis: Storytelling continued: Creativity and my professional self, how it works. Location: JG Homework:

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**Session 18**. **3/23 (Passover holiday Myrna will not be here)Applications and Practice** **Inclusive Learning Environments culture, prior knowledge and Storytelling. Addressing the needs of all learners necessarily means creating more inclusive environments. We will hear from an expert in this area, and consider how to make experiences accessible to more people.** Location: CSC or JG.

**Leader: Ron Rohovit, California Science Center.**

Homework Building Empathy article

Homework: article creativity learned or genetic 29,and storytelling 32,34,22

Homework: Kisiel, J., Rowe, S., Vartabedian, M., and Kopczak, C. 2012. Evidence for family engagement in scientific reasoning at interactive animal exhibits. Science Education. 96:1047-1070. Kopczak, C., Kisiel, J.F. & Rowe, S. 2013. Families talking about ecology at touch tanks. Environmental Education Research. http://dx.doi.org/10.1080/13504622.2013.860429

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**\*Session 19**. **3/28 Applications and Practice: Body Language, (1hr) Beliefs and Learning (1 Hr) .** What can we really tell from body language and other non verbal and verbal cues. What is Knowledge, what is Belief, what is the intersection, how can we deconstruct this to enable the best outcomes.. Homework: Location: JG Homework: Metaphor and Culture Barriers #30, 28, 31

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**\*Session 21**. **3/30 Applications and Practice: Elevator talk**s. Using metaphor in learning application. Revisit learning cycle and see its applications in your elevator talk. Homework: Location: JG Homework: Metaphor and Culture Barriers #30,28,31 **(articles from Linda Chilton)**

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**\*Session 20**. 4/4 **Communicating Controversy.** The next few sessions will deal with first theory and then application on presenting new and controversial topics, using both student chosen topics and the current climate and ocean acidification knowledge, other controversial topics .

Location: JG. Homework: (articles from David)

Leader: Linda Chilton, USC Sea Grant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Session 22**. **4/6 Applications and Practice: Framing Climate Change.** Increasingly, social science has been used to inform communicators on best practices in talking about climate change. First, effective communications orient the public to values so that they understand why climate change is important. Second, the root cause of climate change is unclear to the public. Well-tested metaphors and explanatory chains connect people to the mechanisms of climate change. Lastly, providing community-level solutions can empower people to act in meaningful and productive ways. We will examine these strategies in this class and practice using these elements in communications.

Location: JG Homework: TBD

Leaders: TBD

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**\*Session 23** 4/11 **Applications and Practice: Navigating from Science to Policy**. This session will focus on an overview of an emerging topics in science that will help illustrate how science traverses through sociology to politics. Location: JG. Homework: TBD.

Leaders: James Fawcett, USC Sea Grant.

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**\*Session 24**. **4/13Applications and Practice: Continuation of Framing Navigating Local Government** Continuation of Framing

Local Government insights into the working of a city government. Navigating the quagmire of opinion, personality, finances, and party to achieve results in implementation of complex and new or sometimes controversial programs. Location: JG. Homework: TBD

Leader: Jan Perry

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**Session 25 4/18** **(note Passover holiday Myrna will not be here)** A**pplications and Practice:** S**cience, NSF, and the White House. How does it really work?** This session will give participants an overview of how science is supported and funded, and how scientific interests and accomplishments contribute to the academic hierarchy including Department Chairs, Deans, Provosts and their Committees and National Academies. Location: USCTWR Homework CN Sullivan

Leader: TBD

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**\*Session 26** **4/20 (note Passover holiday Myrna will not be here)**  **Applications and Practice: Navigating from Science to the Media.**  David Medzerian (Sr. editor, digital media Annenberg School for Communication and Journalism)

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**\*Session 27**.4

. 4/25 **Applications and Practice: Tools to communicate** Issues in Copyright law related to presentations and software tools.  This session will examine issues relevant to or other scientific/educational institution, scientific journals etc. and a discussion of fair use adaptations using examples of work you have developed using "borrowed" material from the web, scientific articles, or other sources.   We will discuss how they to modify figures and drawings to avoid copyright infringement or the need to obtain expensive copyright licenses. Location: JG. Homework: TBD.

Presenter: Nisan Steinberg

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**\*Session 28 4/27 Workshop**

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**Session 29**. **Presentation and critique** of our own research ideas to our peers and to audience Location: USCW

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**Session 30.** **Presentation and critique** of our own research ideas to our peers and to audience Location: USCW

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**Finals Week**

exams will discuss availability and your exam schedule so that you can do your practicum at the AOP/ CSC either during exam week, or just before.

**Reading List**

1. U.S. Commission on Ocean Policy. (2004). “**An Ocean Blueprint for the 21st Century: Final Report of the U.S. Commission on Ocean Policy”.**

2. Feynman, R. (1985). “The Amateur Scientist.” From: *Surely You’re Joking Mr. Feynman: Adventures of a Curious Character.* WW Norton & Co.

2. Newberry, T. (2004). Aquariums. The Three penny Review. (http://www.threepennyreview.com/samples/newberry\_su04.html)

3. Chapter 1 of Falk, J. H., & Dierking, L. D. (2000). *Learning from Museums: Visitor Experiences and the Making of Meaning.* Walnut Creek, CA: AltaMira Press.

3. Donovan, S. M., & Bransford, J. D. (2005). Chapter 1: Introduction. In S. M. Donovan & J. D. Bransford (Eds.), *How Students Learn: History, Mathematics, and Science in the Classroom* (pp. 1-28). Washington, D.C.: National Academies Press.

3. Hein, G. (2005). The Constructivist Museum. *GEM News Index*

4. Elstgeest, J. (2001). The Right Question at the Right Tme. In W. Harlen (Ed.), *Primary Science: Taking the Plunge* (pp. 36-45). Portsmouth, NH: Heinemann.

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