Course Outline

BEES6800/TWC371: The Science of Science Communication

School of Biological, Earth and Environmental Sciences

Faculty of Science

Term 3, 2021

1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor Lecturer	A/Prof Carol Oliver	carol.oliver@unsw.edu.au	E-mail request for one-on-one tutorial	0417 477 612 International: 0061 417 477 612 Location: Room 5109 Biosciences Building E26 Kensington campus, Sydney.
Arizona State University lead	Prof Andy Mara	andrew.f.mara@asu.edu		

2. Course information

Units of credit: 6

Teaching times and locations: **Fully online**

2.1 Course summary

Welcome to BEES6800/TWC371 The Science of Science Communication – a fully online course, including at least three 30-minute virtual classes.

The Australian Science Communicators define science communication as *"…the communication of and about science to a general or non-expert audience."* Astrophysicist Neil deGrasse Tyson suggests that effective science communication necessarily involves an evidence-based approach to what we believe (Masterclass, n.d.). How we communicate science (or in almost any other discipline) can persuade and influence others, and that to engage that potential power with others requires the most effective form of communication – storytelling.

The Science of Science Communication course aims to teach students to effectively communicate across a range of audiences about why science matters, how it works and its relevance to society. Students explore the nature of science and the public communication of scientific risk and uncertainty. They also learn about models and purposes of science communication, public trust in science, scientists' credibility among public audiences, and how to measure the

effectiveness of science communication. These insights are the foundation for the effective communication of science to public audiences.

In three interrelated formative-based assessments allow students to build on existing communication skills to learn concise, persuasive writing, the art and science of storytelling regardless of discipline, communicating online in the post-truth world, and the social contexts of science communication. The course focuses on a communicating to non-expert public audience as a foundation to allow students to apply these skills to peer and expert audiences in other contexts regardless of discipline. These outcomes include understanding the theories and models of science communication.

There is no rote learning in this course, and neither is it tested. Instead, students will take away communication skills from this course that they will employ in the future, whether in the workforce or in research.

2.2 Course aims

Communication is a vital skill in an increasingly information-rich world. Science impacts all our lives from a global pandemic to climate change. How science communicate these major shared challenges with non-expert audiences has proven to be critical to the outcomes for a science and technology-driven society as the 2020-21 pandemic has proven. Such challenges are not limited by national borders. Effective communication is at the heart of the future we want for ourselves and our children. The need for good science communicators – and good communicators in other disciplines - has never been greater.

Employers put communication at the top of the soft skills they expect of job applicants. The aim of this course is to build on the foundation of basic skills to the higher level required for effective evidence-based science communication.

2.3 Course learning outcomes (CLO)

At the successful completion of this course students will be able to:

1. Apply strategies in communicating science with words, visuals, and in multimedia for non-expert audiences.
2. Write concisely, design an effective PowerPoint slide deck, and create powerful presentations for multiple audiences. Students will also be able to apply these science communication skills to other areas of study, research, and workplace.
3. Communicate scientific uncertainty, risk, and the nature of scientific inquiry with the objective of maintaining and gaining public trust in science.
4. Apply robust measurement in evaluating the effectiveness of science communication. Apply the theories and models of science communication to the practice of science comunication.

5. Employ the art of knowing the audience, telling a good story, and to do these two things with achievable, measurable objectives in mind.
6. Design an effective social media science communication strategy for non-expert audiences.

2.4 Graduate attributes developed in this course

Faculty of Science Graduate Attributes	**Level of Focus** 0 = No Focus 1 = Minimal 2 = Minor 3 = Major	**Related Tasks & Assessment**
1. Research, inquiry, and analytical thinking abilities.	3	Evaluation of primary and secondary literature; Critical thinking skills in assessing effectiveness of pandemic messaging.
2. Capability and motivation for intellectual development.	3	The course is aimed at encouraging lifelong learning. There is no rote learning, no final exam, and all three assignments are aimed at higher order thinking to develop skills necessary for lifelong learning. Prompting lifelong learning may lead to a wider choice of careers over a working life.
3. Ethical, social, and professional understanding.	2	The course contains ethical considerations in engaging public audiences with the stories of science, particularly in the way information is framed and the persuasive skills that are used to engage audiences with science. An understanding of ethical considerations may be able to be transferred and applied in the workplace.
4. Communication.	3	Students learn how to be good science communicators – to know their audience, to tell a good story and to know why they are telling the story. Employers value communication skills, putting communication at the top of desired attributes in graduates.
5. Teamwork, collaborative, and management skills.	2	Teamwork and collaborative skills are desirable graduate attributes in the workplace. Students are encouraged to participate in the learning environment to practise these skills.
6. Information literacy.	3	Students learn confirmation bias in using internet search engines. Information literacy is critical in workplace decision-making.

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Successful scientists must be effective communicators. They must know how to craft their messages into different shapes for different audiences – from writing a research paper to presentation skills. However, scientists and students alike rarely get the opportunity to learn how to effectively communicate with non-expert public audiences – a critical part of the process of science given the impact on society. This course aims to fill that gap. Students taking this course may consider it a foundation for a career as a science communicator or as a key communication skill needed for their future employment or research.

The teaching strategy is to focus on engaging students with lifelong learning. Communication strategies require practise not rote learning and therefore there is no final exam. There are also **no quizzes** – the focus is on **practising the skills** that are taught. Students should take every opportunity offered to practise writing skills, and when they do, individual feedback will be offered to help the student improve. Engagement with the instructor repeatedly demonstrates it leads to improving marks and the final grade.

The teaching strategies and rationale are designed to open student minds to multiple ways of communicating science now and in the future. The techniques, strategies and content taught in this course are evidence-based, using both the foundational and most recent research in science communication. This is underpinned with the critical and creative scientific thinking throughout the course to allow students to effectively communicate how science works, why science matters and what its relevance is to our culture and to our society.

Assessments are designed to explore different aspects of science communication. The first assessment encourages students to think about the communication of both the processes of science and science knowledge in the context of Government and science messaging to public audiences in the 202-21 pandemic. In the first assessment, you will consider scientific uncertainty, risk and public trust in science. The second assessment practices the art and science of storytelling as a way of making science accessible for non-expert public and government audiences and telling the story in a video presentation. In the third assessment, students construct a social media strategy for a research centre. The latter is to assess student understanding of key the elements of the course, and thus a final exam is not required.

3.2 Assumed knowledge:

There is no assumed knowledge of science communication but students taking this course must have completed 48 Units of Credit equal (UNSW students) or to one year of study at the university/college level (non-UNSW students).

Students should be reasonably confident of *basic* communication skills in writing and presenting in English. If you are not, consider taking BEES2680, Introduction to Science before this course (it runs in Term 1 each year).

This is a third level (third year) course also open to postgraduates.

4. Teaching online and expectations of students

4.1 Format of the course

BEES 6800/TWC371 is fully online and mostly asynchronous. This means you can study the weekly modules flexibly. However, it is strongly recommended you study the module in the week it is released to avoid falling behind in the course.

There are three 30-minute synchronous virtual class discussions throughout the course beginning in Week 1. The dates and times are specified in the course table below. The sessions, focused on assessment help, are intended for direct interaction with me and the rest of the class. These are recorded, but participation is encouraged so students can ask questions that occur during the discussion. Other virtual classes will be held weekly or fortnightly depending on demand.

One-on-one tutorials with me are available on request throughout the course – and you are strongly encouraged to take advantage of this opportunity (multiple times if you wish).

4.2 Expectations of students

Students are expected to:

- Engage with the weekly online modules in the week they are delivered.
- Attend the three virtual synchronous 30-minute classes (dates and times in the course schedule). These are recorded, but students frequently point out the recording is not interactive, so attending the class is preferable.
- Engage with fellow students via the Course Microsoft Teams and in the course forum.
- Read and respond (if needed) to any course messages via Teams or e-mail. There is no course forum – only announcements.

The course requires 150 hours of study. Approximately one third is for course materials, one third for the assignments and one third for self-directed study to support your learning.

Suggestions are made on additional reading materials throughout the course with links to the

course Leganto list, which provides rapid access to the papers and other reading material.

The course textbook is *"The Science of Communicating Science"* by Craig Cormick, CSIRO Publishing, but there is no need for you to buy this in hard copy or Kindle since it is available on the Leganto list. The specific chapters for reading are in the appropriate study week, but you have access to the whole book by being a student on this course.

4.3 Course activities

Lessons – The core content is delivered via short electronic books (e-books) containing text, images, and videos fully online and aimed at student comprehension of the key concepts in science communication and to provide students with the tools to communicate science effectively to peer and lay audiences. Students also undertake readings to deepen understanding. If you have internet or technology issues, you can download the e-books as interactive chapters. This means that you can access videos (though this does need access to the internet). Just click on the title within the otherwise blank box where a video would have been.

Three assessments – These assessments are aimed at helping students build confidence in their understanding of science communication. They are all formative as well as summative activities, so should be treated as learning opportunities supported by the course materials. The assessments are all split into parts, all beginning with a low stakes Part A to check your understanding of the course materials and to get feedback before attempting the main assignment. For rapid feedback, Assessment 1, Part A, is due early in the class - in Week 2.

The total course marks out of 100% are based on:

Assessment 1 A and B = 25%; Assessment 2 A and B = 25%; Assessment 3 A, B and C = 50%.

4.4 How to be successful in this course

Now: Treat this course as you would a face-to-face course. Review the course outline carefully and ask me any questions you may have. Create a schedule for the reading of the modules, the additional reading to increase your depth of understanding, and time to undertake assessments. Read assessments and rubrics – studies indicate up to 80% of students do not perform this simple function and lose marks by not addressing the assessment and rubrics. But equally, some part of the assessment or rubrics may not make sense to you. If you find you are not completely confident with the assessment and rubrics, or the content of the week's module, book a one-on-one tutorial with me so we can discuss.

Daily: Read any announcements posted in the course.

Weekly: Complete the current week's module, including readings. Take notes when reading course materials or watching videos as you would in a face-to-face course. Studies show that writing notes by hand helps you to learn and reflect and ultimately to do better on assessments, so consider whether this would be helpful to you. Reading online andwatching the videos without note-taking is a less effective learning strategy. Lack of note-taking may result in assessments taking longer to undertake or feeling you have not grasped the content. You are strongly encouraged to begin assessments at least in the previous week before the assessment is due.

Anytime: Connect with me, Carol, your instructor if you have any questions in advance of due dates. I am here to help, and I really like to see my students do well.

5. Course schedule and structure

This course consists of up to four hours per week to complete modules plus three 30-minute online classes (total around 37 hours). It the modules take you longer than estimated, please contact me. You are expected to take the remaining 123 hours (= total 150 hours) to complete assessments, practising the skills taught and undertaking additional suggested reading. Week 6 (flexibility week) is free of new course materials and assessments. Week 10 is also free of new materials but support for the final assessment is provided.

Week	Module	Content	Learning opportunities
Week 1	Introduction to science communication	Non-expert audiences, public understanding of science and public scientific literacy	Virtual Class 1 Friday Week 1, 09.30 Sydney time (30 mins)
Week 2	Scientific uncertainty,risk, and trust in science	Communicating scientific uncertainty and risk; credibility and trust in science.	Submit outline for Assessment 1 Part A Friday Week 2, 7 pm Sydney time
Week 3	Science and the traditional and social media	Traditional and social media and the circle of influence; relationship between the media and scientists; ethical consequences of framing selection in connecting with non-expert audiences.	

Week 4	The art and neuroscience of storytelling	The social brain and storytelling; the art and neuroscience of storytelling; elements of an engaging presentation.	Submit full article for Assessment 1 Part B Friday 7 pm Week 4 Sydney time
Week 5	Theories and modelsof science communication	Framework of science communication from deficit to dialogue models; theories and practice of science communication.	Virtual Class 2 Friday Week 5 at 09.30 (30 mins) Submit Assessment 2 Part A Friday Week 5 7 pm Sydney time
Week 6	**Flexibility week**	**No coursework or assessments**	
Week 7	Social media in a post-truth world	Social media past and present; Impact of social media; Fake news, junk science or just plain bad science?	Submit Assessment 2 Part B Friday Week 7 7 pm Sydney time
Week 8	Evidence-based science communication	Writing a social media plan for a research centre; Goals, objectives, strategies, and tactics; Evaluation planning; measuring the effectiveness of science communication; Practicalities of social media in the research science context. Case studies in research centre social media strategies.	Submit Assessment 3 Part A. Friday Week 8 7 pm Sydney time

Week 9	Persuasive writing	Persuasive writing; ethos, logos and pathos; Confirmation bias; changing beliefs, values, attitudes and behaviours.	Virtual Class 3: Friday Week 9, 09.30 Sydney time.
Week 10	Assessment 3 support	No new material	Submit Assessment 3 Parts B and C Sunday 11.59 pm Sydney time Week 10

6. Assessment tasks

Assessment task	Length	Weight	Mark	Due date
Assessment 1: Assignment 1 is an article on COVID-19 that explores the communication of the nature and processes of science, probability, risk, and uncertainty. This assessment is in two parts – Part A due in Week 2 and Part B is the full article due in Week 4 with the benefit of feedback from Part A's submission.	Up to 1,500 words	25%	25	Week 2 Part A, Week 4 Part B
Assessment 2: Assignment 2 Part A is a story plan due in Week 5. Part B is a script and a 3-minute video with the public as the target audience due in week 7.	Up to 600 words for Part A; script and 3-minute video	25%	25	Part A Week 5 Part B Week 7

Assessment 3: Students prepare and justify a plan for a research centre to engage with the public through social media. The assignment has three parts. First, students produce an outline of a social media plan (600 words, worth 10% of the course marks and due in Week 8) to receive feedback before proceeding to the final plan. They then produce the final plan (1,500 words and worth 30% of the course marks) together with a sample of a posting (worth 10% of the course marks) due in Week 10.	Part A: up to 600 words Part B: up to1,500 words Part C: Up to 150 words	50%	50	Part A Week 8 Parts B and C Week 10

7. Referencing and academic integrity

Referencing is a way of acknowledging the sources of information that you use to research your assessments. You must provide a reference whenever you quote or paraphrase someone else's words, ideas, or research. Not referencing in these circumstances is called plagiarism. If you are not certain of what plagiarism is then go to this UNSW link <https://student.unsw.edu.au/plagiarism>.

This course uses APA referencing style. Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing> and for APA style, here <https://student.unsw.edu.au/apa>.

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: Honesty, trust, fairness, respect, responsibility, and courage. At UNSW, this means that your work must be your own, and this includes all forms of cheating. UNSW takes academic integrity very seriously, and there are serious consequences if your work is found to be not your own, including using the work of others without referencing.

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct

8. Special consideration

You should not undertake an assessment if you are not fit to do so. This may

extend beyond issues relating to your physical and mental health. This includes issues around the current pandemic. If you are uncertain about whether you qualify, the best tack is to apply for Special Consideration through your MyUNSW without hesitation. More information on Special Consideration can be found here: <https://student.unsw.edu.au/special-consideration>.

Equitable Learning Plan students must present their plan to me in Week 1. This is to enable me to fully support your needs.

Students facing learning difficulties (whether temporary or permanent) should approach Equitable Learning Services to discuss whether an Equitable Learning Plan would be helpful. The link is here < https://student.unsw.edu.au/els/register>

9. Gaining a sense of learning community

A sense of learning community is important in learning. In an online course, your active involvement in the virtual classes will help you feel this sense of community You are also strongly encouraged to engage with me in relation to the course content through the virtual classes, one-on-one tutorials, and e-mail.

I generally aim to respond to your enquiries with 12 hours and often much sooner. Please feel free to follow up if you do not get a response in that timeframe.

All correspondence will be via your UNSW student account. You can contact me at carol.oliver@unsw.edu.au. I am very happy to answer any questions, or provide advice, about the course via my email address.