Scientific Communication & Academic Writing in Chemical Science (Credit: 3)

Academic Semester: 2026 Fall

Lecture: Tue 13:20-15:10 am at R121

Lecturer	Wang, Yu-Heng（王育恒）
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Office Location	R401
Office Hour	By appointment

A. Course Description

This 16-week course trains junior/senior undergraduates, as well as graduate students in the chemical sciences, to effectively communicate scientific ideas through writing and presentations. Students will learn the foundations of scientific writing, including clarity of language, proper structure of scientific papers, and ethical practices in research communication. Emphasis is placed on developing **scientific writing skills**, **oral and poster presentation techniques**, **research proposal writing**, and preparing professional documents, such as a personal **curriculum vitae and a job cover letter**. The early weeks focus on the fundamentals of writing and literature research, while the later weeks build toward producing a polished 8-page research proposal and presenting a scientific poster. By the end, students will be able to search and evaluate chemical literature, communicate their research clearly in writing, create effective visual aids, and tailor their communication for various academic and professional contexts.

B. Course Components

Curriculum Vitae. Students will create a professional and concise academic CV highlighting their education, research experiences, publications, technical skills, awards, and relevant activities. The CV should be tailored specifically for career opportunities or graduate programs in chemical sciences. Assessment criteria include clarity, organization, relevance, completeness, and professional formatting.

Job Cover Letter. Students will draft a customized, persuasive cover letter targeted toward a specific chemical science-related job or graduate program application. The letter must clearly articulate the student's relevant experience, skills, and suitability for the chosen position, highlighting how their background aligns with the requirements. Assessment focuses on clarity, persuasiveness, specificity, professionalism, and proper formatting.

5-minute Poster Talk. Students will prepare and present a scientific poster summarizing a research topic or literature review relevant to their thesis topics. Students are asked to deliver a

concise 5-minute oral explanation of their poster to an audience of peers and instructors, simulating a scientific conference setting. The talk should clearly summarize the research question, methods, key findings (or literature insights), and significance of the work. Emphasis will be placed on the student's ability to communicate complex chemical concepts clearly and engagingly within a strict time limit.

10-Page Research Proposal. The proposal should describe a research idea that directly addresses a knowledge gap. Ideally, the topic area of your proposal should be aligned with the scope of your graduate or undergraduate research areas. Proposals that explore a field or topic far from your current research are encouraged as well. The following components should be included in this research proposal: I. Goals and Importance; II. Experimental Approach; III. Outcomes and Impacts; IV. References.

Peer Review: Students will conduct a structured peer review of a classmate's 8-page research proposal. Each reviewer will critically evaluate the clarity, coherence, significance, methodological appropriateness, and feasibility of the proposal, providing constructive written feedback aimed at enhancing its strength. Assessment criteria include thoroughness, constructive tone, clarity of feedback, and the usefulness of recommendations provided.

C. Goals, Objectives, and Core Learning Outcomes

This course aims to equip students in chemical sciences with advanced skills in scientific communication, preparing them to effectively articulate ideas, research findings, and professional qualifications across academic and professional settings. Students will gain proficiency in scientific writing, critical reviewing, visual and oral presentation skills, and professional document preparation, enabling them to communicate chemical research clearly, accurately, and persuasively.

D. Required Knowledge

To succeed in this course, students are expected to possess foundational knowledge and skills acquired through previous coursework or experiences in the chemical sciences. Specifically, students should be able to:

- *Understand basic chemical principles:*
  Familiarity with fundamental concepts and terminology in chemistry, including general, organic, inorganic, analytical, and physical chemistry.
- *Perform scientific literature searches:*
  Basic competence in navigating chemical literature databases (e.g., SciFinder, Web of Science, Google Scholar) and retrieving peer-reviewed journal articles.
- *Analyze scientific literature:*
  Ability to read, interpret, and summarize findings from scientific research papers.
- *Demonstrate proficiency in basic scientific writing:*
  Ability to produce clear, coherent paragraphs, summarize scientific findings accurately, and organize ideas logically.
- *Communicate effectively in English:*

Adequate proficiency in English language reading, writing, and speaking at an academic level, suitable for clearly articulating scientific ideas and presenting technical information.

E. Academic Dishonesty

Academic dishonesty is incompatible with the practice of science or any profession. If evidence of dishonesty is found, the policy of the National Tsing Hua University will be followed. This includes any form of plagiarism, copying, collusion, or cheating during any examination or assessment. All such cases are reported to the NTHU. Violations may result in failure on a particular assignment, failure in a course, suspension or expulsion from the University, or other penalties. Each student in this course is expected to work entirely on her/his own while taking the exams. Academic misconduct in lectures may result in a penalty consistent with university policy.

E. Recommended References

1. "The ACS Guide to Scholarly Communication" (2020, online continuously updated) *Edited by Gregory M. Banik, Grace Baysinger, Prashant V. Kamat, and Norbert Pienta*
   Publisher: American Chemical Society
   Link: https://pubs.acs.org/isbn/9780841235830
2. "Write Like a Chemist: A Guide and Resource," 2nd Edition (2022)
   Marin S. Robinson, Fredricka L. Stoller, Molly Costanza-Robinson, James K. Jones
   Publisher: Oxford University Press
   ISBN: 978-0190098945
3. Scholz, F. Electroanalytical methods: guide to experiments and applications; Springer-Verlag: Berlin, 2010 [Electronic Resource].
4. "Writing Scientific Research Articles: Strategy and Steps," 2nd Edition (2013)
   Margaret Cargill and Patrick O'Connor
   Publisher: Wiley-Blackwell
   ISBN: 978-1118570708
5. Bruck, L. B.; Towns, M. H. Scientific Writing in Undergraduate Chemistry Laboratories: Helping Students Learn to Write. *J. Chem. Educ. 2016*, 93 (7), 1179–1185. https://doi.org/10.1021/acs.jchemed.6b00903
6. MIT Career Advising & Professional Development. Make a Resume, Cover Letter, and CV. https://capd.mit.edu/channels/make-a-resume-cover-letter-cv/
7. UC Davis Internship and Career Center. *Career Center – UC Davis*. https://careercenter.ucdavis.edu/

F. Method of Evaluation

Assignment	*Weight*	*Points*
(1) Curriculum Vitae	20%	20
(2) Job Cover Letter	20%	20
(3) 10-Page Research Proposal	15% (draft)	15
	25% (final)	25
(4) Peer Review	15%	15
(5) 5-minute Poster Talk	15%	15
		Total Points: 110

Letter grades will be assigned at the end of the semester based on the following scale:

Total Points	*Letter Grade (GPA)*
≥ 90	A+
85–89	A
80–84	A–
77–79	B+
73–76	B
70–72	B–
67–69	C+
63–66	C
55–62	C–
50–54	D
< 50	E

*Final grades will be based on an absolute scale. For example, if you earn a total of 90 points, you are guaranteed an A+, no matter how many other students earn that number of points. You are competing against this scale, not against other students; it is to your benefit to help one another.

Tentative Course Outline

Week	*Date*	*Topic*	*Note*
1	8/31–9/6	Introduction Writing the Research Proposal	
2	9/7–9/13	Resume, Cover Letter, and CV	
3	9/14–9/20	Resume, Cover Letter, and CV	
4	9/21–9/27	How to Get What You Want by Writing Great Emails	
5	9/28–10/4	Preparing a PPT Presentation	CV & Job Cover Letter (due by 10/11)
6	10/5–10/11	Preparing a PPT Presentation	
7	10/12–10/18	How to Read a Scientific Paper	
8	10/19–10/25	No Lecture	Research Proposal Draft (due by 10/25)
9	10/26–11/1	How to Read a Scientific Paper	
10	11/2–11/8	Whitesides' Group Writing a Paper	
11	11/9–11/15	The ACS Style Guide	
12	11/16–11/22	A Brief Guide to Writing in Chemistry	Peer Review (due by 11/22)
13	11/23–11/29	Steps to Structuring a Science Paper	
14	11/30–12/6	Steps to Structuring a Science Paper	
15	12/7–12/13	A Bit of Grammar	
16	12/14–12/20	5-minute Poster Talk (How to Prepare for a Scientific Poster)	Research Proposal Final (due by 12/20)