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

Academic Semester: 2026 Fall

Lecture: Monday 9:00-9:50 am; Wednesday 10:10-12:00 pm at R325

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Office Location	R401
Office Hour	By appointment

[This is a Mandarin-taught course. If you are looking for an English-taught course in the subject of writing, please check the courses offered by the Center for Language Education.]

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 clear language, proper scientific paper structure and ethical practices in research communication. The course emphasizes developing scientific writing skills, oral and poster presentation guidelines, research proposal writing, and professional documents such as a personal curriculum vitae and a job cover letter. The early weeks focus on the fundamentals of writing and research in literature. In contrast, the later weeks build toward producing a polished 10-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, concise academic CV highlighting their education, research experience, publications, technical skills, awards, and relevant activities. The CV should be tailored to specific career opportunities or graduate programs in the 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 will deliver a concise 5-minute oral presentation of their poster to peers and instructors in a simulated 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. Include the following components in this research proposal: I. Abstract; II. Background and Significance; III. Specific Aims (Aim 1 & Aim 2); IV. References.

Peer Review: Students will conduct a structured peer review of a classmate's research proposal. Each reviewer will critically evaluate the proposal's clarity, coherence, significance, methodological appropriateness, and feasibility, and provide constructive written feedback to strengthen it. 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 scientific communication skills, preparing them to articulate ideas, research findings, and professional qualifications effectively 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.

Keywords: scientific writing (科學寫作), oral and poster presentation (口頭和海報報告), research proposal (研究計畫), curriculum vitae (履歷), job cover letter (求職信)

D. Required Knowledge

To succeed in this course, students are expected to have foundational knowledge and skills from previous coursework or experience 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 National Tsing Hua University policy 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 in 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 their own during 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
	20% (final)	20
(4) Peer Review	15%	15
(5) 5-minute Poster Talk	20%	20
		Total Points: 110

If you turn in an assignment late, 10% of that assignment's total grade will be deducted for each day of lateness.

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

Total Points[1]	*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

[1] 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 other students; it benefits everyone to help one another.

Tentative Course Outline

Week	*Date*	*Topic*	*Note*
1	9/6–9/12	Introduction	No Lecture on 9/9
2	9/13–9/19	Writing the Research Proposal	No Lecture on 9/16
3	9/20–9/26	Resume, CV, and Cover Letter	
4	9/27–10/3	Resume, CV, and Cover Letter	No Lecture on 9/28 (Teacher's Day)
5	10/4–10/10	How to Get What You Want by Writing Great Emails	CV & Job Cover Letter (due by 10/10)
6	10/11–10/17	Preparing a PPT Presentation	
7	10/18–10/24	How to Read a Scientific Paper	
8	10/25–10/31	Whitesides' Group Writing a Paper	No Lecture on 10/26 (Taiwan Restoration Day) Research Proposal Draft (due by 10/31)
9	11/1–11/7	A Brief Guide to Writing in Chemistry	
10	11/8–11/14	12 Steps to Structuring a Science Paper	
11	11/15–11/21	12 Steps to Structuring a Science Paper	
12	11/22–11/28	The ACS Style Guide	Peer Review (due by 11/28)
13	11/29–12/5	A Bit of Grammar	
14	12/6–12/12	No Lecture	
15	12/13–12/19	How to Prepare for a Scientific Poster	
16	12/20–12/26	5-minute Poster Talk	Research Proposal Final (due by 12/26)