



CM 271 COMMUNICATIONS FOR SCIENCE AND ENGINEERING
IES Abroad Madrid

DESCRIPTION:

This course develops students' ability to communicate effectively as scientists and engineers in academic and professional contexts. Students will learn to write and present technical information clearly, persuasively, and ethically for diverse audiences ranging from peers and experts to policy makers and the general public. Through major assignments—including résumés, technical reports, research proposals, failure analyses, and oral presentations—students will practice the genres of professional engineering and scientific communication most relevant to their careers. Emphasis will be placed on clarity of style, audience awareness, visual design of information, teamwork, and professional ethics in communication

CREDITS: 3 credits

CONTACT HOURS: 45 hours

COURSE FREQUENCY: 2 times per week

LANGUAGE OF INSTRUCTION: English

INSTRUCTOR: TBD

PREREQUISITES: None

ADDITIONAL COST: None

METHOD OF PRESENTATION:

- Interactive lectures
- Writing workshops and peer review sessions
- Group projects and collaborative problem-solving
- Student presentations with audiovisual support

REQUIRED WORK AND FORM OF ASSESSMENT:

- Writing Assignments – 40%
- Major Proposal Project – 20%
- Oral Presentations – 15%
- Peer Review and Workshops – 10%
- Homework and Short Exercises – 5%
- Participation – 10%

Writing Assignments

Students will complete four substantial written assignments, each designed to practice a different technical communication genre:

- **Résumé and Job Application Letter (5%)** – A professional résumé and tailored cover letter for a technical position or internship. Graded on clarity, persuasiveness, formatting, and alignment with industry expectations.
- **Technical Description (5%)** – A precise, audience-targeted description of an object, process, or mechanism (e.g., medical device, coding algorithm, or lab equipment). Must include visuals or diagrams. Graded on technical accuracy, clarity, and effective integration of figures.
- **Failure Analysis (5%)** – A structured report analyzing a real-world engineering or scientific failure (e.g., bridge collapse, software system breakdown, medical device malfunction). Emphasis on tone, ethics, use of evidence, and clarity of recommendations.
- **Research Report (15%)** – A 6–8-page report synthesizing scholarly and professional sources on a STEM-related problem. Students must integrate data displays (charts, figures, tables) and follow IEEE or APA style.

Major Proposal Project

Students will form small groups to develop a **Research or Design Proposal** on a real-world STEM problem. Deliverables include:

- **Written Proposal (individual submission, 10%)** – A polished, professional document outlining problem statement, background research, methodology, feasibility analysis, budget, and ethical considerations.
- **Group Proposal (10%)** – A collaboratively developed final version, integrating individual sections into a cohesive whole with unified style, formatting, and visuals. Graded on organization, feasibility, persuasiveness, and professionalism.

Oral Presentations

Students will practice professional STEM oral communication through three presentations:

- **Elevator Pitch (3%)** – A 90-second persuasive presentation of a technical concept or project to a general audience.
- **Project Briefing (5%)** – A concise, 5-minute technical update presented to peers as if to supervisors or clients. Graded on structure, concision, and visuals.
- **Final Proposal Presentation (7%)** – A formal group presentation (8–10 minutes) of the proposal project, with Q&A. Graded on clarity, use of visuals, team delivery, and ability to engage technical/non-technical audiences.

Peer Review and Workshops

Students will provide structured written and oral feedback on drafts of peers' résumés, descriptions, reports, and proposals. Graded on timeliness, constructiveness, and application of course concepts.

Homework and Short Exercises

Weekly exercises focus on **grammar, style, and visual design** for technical writing. Examples include:

- Sentence revision drills for clarity and concision
- Style/grammar quizzes
- Visual communication tasks (redesigning poorly formatted graphs)
- Short user-manual assignments for everyday devices

Participation

Active engagement in discussions, workshops, peer review, and group activities is expected. Students will be assessed on:

- Preparation and contribution to class discussions
- Willingness to collaborate and share drafts
- Consistency in meeting deadlines

LEARNING OUTCOMES:

By the end of the course, students will be able to:

- Plan, draft, revise, and edit professional scientific and engineering documents.
- Adapt style, structure, and format to different audiences and purposes.
- Incorporate data, evidence, and graphics effectively in technical documents.
- Deliver clear and engaging oral presentations tailored to technical and non-technical audiences.
- Collaborate productively on group projects and peer reviews.
- Apply principles of communication ethics, including proper citation and avoidance of plagiarism.

ATTENDANCE POLICY:

As a member of our class community, you are expected to be present and on time every day. Attending class has an impact on your learning and academic success. For this reason, attendance is mandatory for all IES Madrid classes, including course-related excursions. Absences will only be excused in cases of documented medical or family emergencies. You are allowed a maximum of one unexcused absence for once-a-week courses and two unexcused absences for twice-a-week courses. Each additional unexcused absence will result in a deduction of 3 percentage points from your final grade and/or disciplinary action. Accumulating 7 or more unexcused absences in twice-a-week courses, or 4 or more in once-a-week courses, may result in a failing grade for the course.

Late or missed submission of assessed work: any assessed work, including exams, tests, and presentations, will be rescheduled only if the absence is justified; otherwise, it will be graded as zero.

Punctuality is critical: three instances of being over 10 minutes late will be counted as one absence and being more than 15 minutes late will also count as one absence.

For more information, please refer to the full Attendance and Punctuality Policy document.

CONTENT:

Session	Content	Assignments
Session 1	Foundations of Technical Communication • Introduction: purpose & audience in technical writing • Lecture & discussion • Case study review	Reading • Last et al. (2019) pg. 11 to 31 (20 pages). Assignment • Clarity/conciseness exercise
Session 2	Principles of Clarity, Conciseness, & Plain Language • Short writing exercises	Readings • Last et al. (2019) pg. 37 to 51 (14 pages). • Alley (2018) pg. 83 – 96 (13 pages). • https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE-Editorial-Style-Manual-for-Authors.pdf Assignment • Creating a LinkedIn profile based on a technical profile
Session 3	Structuring & Formatting in STEM Documents • Sample analysis • Formatting workshop	Reading • Last et al. (2019) pg. 179 to 186 (7 pages). Assignment • Draft of Résumé/Letter • Constructive critique of a peer LinkedIn profile
Session 4	Résumé & Job Application Letter • Workshop & peer review • LinkedIn profile	Reading • Last et al. (2019) pg. 51 to 70 (19 pages). Assignment • Style/grammar drills

Session	Content	Assignments
Session 5	Writing Fundamentals - Sentences & paragraphs for technical style - Practice editing for tone & precision	Readings - Alley (2018) pg. 119 to 127 (8 pages). - Irish and Weiss (2013) pg. 18 to 47 (29 pages).
Session 6	Grammar & Mechanics for Professional Writing Exercises & group practice	Readings - Last et al. (2019) pg. 109 to 123 (14 pages). - Alley (2018) pg. 228 – 254 (26 pages). Assignment - Final Résumé/Letter Due
Session 7	Peer Review: Résumés & Letters In-class critique	Readings - Last et al. (2019) pg. 203 to 210 (7 pages). - Alley (2018) pg. 170 to 177 (7 pages). Assignment - Start Technical Description assignment
Session 8	Technical Descriptions (Objects, Processes, Mechanisms) Lecture & drafting workshop	Reading - Alley (2018) pg. 195 to 206 (9 pages). Assignment - Peer collaboration on Technical Description assignment
Session 9	Visuals & Presentations	Readings - Last et al. (2019) pg. 211 to 225 (14 pages). - Alley (2018) pg. 221 to 227 (6 pages). Assignment - Visuals integration practice

Session	Content	Assignments
Session 10	Visuals & Data Integration (Tables, Charts, Figures) Hands-on data exercise	Reading - Last et al. (2019) pg. 225 to 232 (7 pages). Assignment - Create a brief user manual for one of your devices or apps (calculators, watches, etc.). Include images if helpful.
Session 11	Writing Instructions & User Manuals Drafting activity	Readings - Jones, D.R.H, ed (2001) pg. 117 to 138 (21 pages). - Alley (2018) pg. 195 to 206 (9 pages). Assignment - Start Failure Analysis
Session 12	Failure Analysis: Structure & Tone Case study review	Reading (https://www.sciencedirect.com/science/article/pii/S2213290217300238). Case Study, 8 pages. Assignment - Technical Description due
Session 13	Peer Review: Descriptions & Failure Analyses In-class peer editing	Reading (https://www.sciencedirect.com/science/article/pii/S2213290216300189) Case Study, 8 pages. Assignment - Report writing sample
Session 14	Report Writing Process description, data display, analysis, and conclusions	Reading - Irish and Weiss (2013) pg. 100 to 126 (26 pages). Assignment - Annotated bibliography exercise

Session	Content	Assignments
Session 15	Research Methods - Evaluating sources - Library session/databases	Assignment Review the IEEE Style Manual
Session 16	Ethics - Citations and avoiding plagiarism - APA/IEEE style workshop	Reading - Last et al. (2019) pg. 211 to 225 (14 pages). Assignment - Research report
Session 17	Technical Reports - Organization and style - Sample reports analysis	Reading - Last et al. (2019) pg. 101 to 130 (29 pages). Assignment - Failure analysis due
Session 18	Progress & Feasibility Reports Drafting workshop	Reading Last et al. (2019) pg. 225 to 232 (7 pages).
Session 19	Elements of Effective Proposals - Lecture and group brainstorming - Proposal project assigned	Reading - Last et al. (2019) pg. 233 to 244 (11 pages). - Alley (2018) pg. 178 to 194 (16 pages). Assignment - Proposal draft progress check
Session 20	Group Work Session: Drafting Proposals Collaborative drafting	Reading - Last et al. (2019) pg. 127 to 133 (6 pages). Assignment - Proposal draft due

Session	Content	Assignments
Session 21	Peer Review: Proposals In-class critique session	Reading - Irish and Weiss (2013) pg. 280 to 299 (19 pages). Assignment - Oral presentation 1: elevator pitch
Session 22	Oral Communication - Elevator pitch and briefings - Practice presentations	Reading - Irish and Weiss (2013) pg. 300 to 313 (13 pages). Assignment - Oral presentation 2 - Final proposal due
Session 23	Final Session - Final proposal presentations - Formal group presentations	Reading Irish and Weiss (2013) pg. 245 to 279 (34 pages).

COURSE-RELATED TRIPS:

- Guided Visit to either the Biblioteca Nacional de Ciencias de Salud or to the Biblioteca del Museo Nacional de Ciencias Naturales.
- Innovation-related Corporate or Trade Fair Tour (such as IFEMA) with class debrief on technical delivery and effectiveness.

REQUIRED READINGS

- Alley, Michael. *The Craft of Scientific Writing*. 4th ed. New York: Springer, 2018.
- Hart, Heather. *Engineering Communication*. 2nd ed. Toronto: Pearson Canada, 2017.
- Hofmann, Angelika H. *Scientific Writing and Communication: Papers, Proposals, and Presentations*. 5th ed. New York: Oxford University Press, 2022.
- Institute of Electrical and Electronics Engineers. *IEEE Editorial Style Manual for Authors*. Piscataway, NJ: IEEE Publishing Operations, updated July 29, 2024. <https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE-Editorial-Style-Manual-for-Authors.pdf>
- Last, Suzan. *Technical Writing Essentials*. 2019. Creative Commons. <https://pressbooks.bccampus.ca/technicalwriting/>.

RECOMMENDED READINGS

- Olson, Randy. *Houston, We Have a Narrative: Why Science Needs Story*. Chicago: University of Chicago Press, 2015.
- Strunk, William, and E. B. White. *The Elements of Style*. 4th ed. New York: Pearson, 2000.

INSTRUCTOR BIOGRAPHY

TBD