

Technical Writing - AES

Level: 2

Career Cluster: Advanced Manufacturing

Program: Engineering

Pathway(s): Engineering Applications UAS, Aerospace Engineering Technician, Engineering

Aligns with: ENG 1031 Technical Writing

Course Catalog Description

Introduces students to the principles and practices of technical writing in aerospace engineering, aviation, and related workplace settings. Students create clear, accurate, and professional documents while using research, digital tools, visuals, and revision strategies to communicate technical information for specific audiences and purposes in aerospace contexts.

Summary

This course develops the knowledge and skills students need to create clear, accurate, and professional technical documents for aerospace engineering, aviation, and related workplace settings. Students examine the purpose and structure of technical writing, adapt communication for specific audiences and purposes, and use digital tools to draft, format, revise, and publish documents. Through research, process writing, technical descriptions, visual communication, and collaborative writing tasks, students learn to organize information effectively and present it in formats such as reports, instructions, manuals, memos, maintenance documentation, procedures, and presentations. The course also emphasizes information literacy, ethical source use, intellectual property, revision strategies, regulatory awareness, and professional standards so students can produce polished technical documents that support aerospace systems, operations, safety, and communication in academic, industry, and postsecondary contexts.

Notes

The updated course reflects a shift from a general writing-focused course to a more comprehensive, industry-aligned technical communication program embedded within aerospace and engineering contexts. The original course primarily emphasized basic writing conventions, document structure, and communication skills with limited focus on application. In contrast, the revised course expands these foundations into a structured framework that emphasizes audience analysis, digital tools, visual communication, research and information literacy, and creation of industry-relevant documents such as reports, manuals, and maintenance documentation. Additionally, the updated version incorporates ethical considerations, intellectual property, collaboration, revision processes, leadership, work-based learning, and a formal final documentation project. These updates strengthen alignment with current CTE expectations by emphasizing professional communication, real-world application, and career readiness in aerospace and engineering environments while maintaining core technical writing principles.

Student Learning Outcomes

1. Career Exploration and Postsecondary Opportunities

Objective: *Students will analyze career pathways in aerospace engineering technician by exploring industry roles, workplace expectations, required education, certifications, professional organizations, and postsecondary opportunities available in Colorado in order to make informed academic and career decisions.*

- 1) Identify employment opportunities in various fields with a focus in the area of aerospace engineering technician
 - a. Recognize the work typically performed, tools and technology used, and nature of work environments
 - b. Identify potential certifications within the careers
 - c. Find membership organizations associated with the careers
 - d. Understand the necessary education associated within the careers
- 2) Define professionalism within the context of aerospace engineering technician
 - a. Criticism and evaluation
 - b. Presentation
 - c. Assessment
- 3) Recognize laws, regulations, and ethics significant to the fields of aerospace engineering technician
- 4) Identify postsecondary opportunities offered in the state of Colorado
 - a. Technical college, community college, 4-year institutions
 - b. Certificates, associates, bachelor, and advanced degree opportunities

2. Foundations of Technical Writing in Engineering

Objective: *Students will understand and analyze the purpose, structure, and role of technical writing in aerospace engineering, aviation, and digital communication environments.*

- 5) Define technical writing and its role in aerospace and aviation fields.
- 6) Differentiate between technical and non-technical writing styles.
- 7) Describe characteristics of effective technical communication.
- 8) Analyze how audience and purpose influence writing choices.
- 9) Evaluate examples of strong and weak technical documents.

3. Digital Communication Tools and Platforms

Objective: *Students will apply and evaluate digital tools used to create, edit, share, and manage technical documents.*

- 10) Identify digital tools used for technical writing such as word processors, collaborative platforms, and cloud tools.
- 11) Demonstrate the use of digital writing environments for document creation.
- 12) Apply formatting tools to improve readability and organization.
- 13) Evaluate digital tools based on usability and collaboration features.
- 14) Manage files using cloud-based systems and version control.

4. Audience, Purpose, and Professional Tone

Objective: Students will analyze and adapt writing to meet audience needs and professional expectations in aerospace engineering and aviation contexts.

- 15) Identify target audiences for aerospace and aviation documents.
- 16) Analyze audience needs and expectations.
- 17) Adjust tone, vocabulary, and structure for different audiences.
- 18) Apply professional tone in written communication.
- 19) Evaluate effectiveness of communication based on audience feedback.

5. Technical Writing Formats and Document Types

Objective: Students will create and analyze common technical documents used in aerospace engineering, aviation, and digital environments.

- 20) Identify common technical writing formats such as reports, manuals, instructions, memos, checklists, and maintenance records.
- 21) Explain the purpose of different document types.
- 22) Create structured technical documents using standard formats.
- 23) Organize information clearly using headings, lists, and visuals.
- 24) Evaluate document effectiveness based on clarity and usability.

6. Research, Information Literacy, and Source Use

Objective: Students will gather, evaluate, and integrate information from digital sources into technical writing.

- 25) Identify credible digital sources for technical information.
- 26) Evaluate sources for accuracy and relevance.
- 27) Summarize research findings in clear and concise language.
- 28) Integrate research into technical documents appropriately.
- 29) Cite sources using accepted formats.

7. Technical Description and Process Writing

Objective: Students will develop and communicate clear descriptions and step-by-step technical procedures for aerospace tools, systems, and operations.

- 30) Describe aerospace technical systems, tools, and processes.
- 31) Write step-by-step instructions for technical tasks.
- 32) Organize procedural writing logically and clearly.
- 33) Use visuals and formatting to support clarity.
- 34) Evaluate instructions for usability and accuracy.

8. Visual Communication and Data Representation

Objective: Students will interpret and create visual representations of technical information used in aerospace and aviation communication.

- 35) Interpret graphs, charts, diagrams, and schematics.
- 36) Create visuals to support technical writing.
- 37) Integrate visuals into documents effectively.
- 38) Analyze how visuals enhance communication.
- 39) Evaluate clarity and accuracy of visual data.

9. Editing, Revising, and Document Quality

Objective: *Students will apply revision strategies to improve clarity, accuracy, and professionalism in technical documents.*

- 40) Apply editing techniques to improve grammar and structure.
- 41) Revise documents based on feedback.
- 42) Analyze clarity and coherence of writing.
- 43) Evaluate writing for accuracy and completeness.
- 44) Produce polished, professional technical documents.

10. Ethics, Intellectual Property, and Digital Responsibility

Objective: *Students will analyze ethical considerations and apply responsible practices in digital technical communication.*

- 45) Define intellectual property and copyright.
- 46) Explain ethical issues in technical communication.
- 47) Apply proper citation and attribution practices.
- 48) Analyze ethical challenges in digital publishing.
- 49) Evaluate consequences of unethical behavior.

11. Collaboration and Team Communication

Objective: *Students will collaborate and communicate effectively using digital tools in aerospace engineering and aviation contexts.*

- 50) Collaborate using digital communication tools.
- 51) Contribute effectively to team writing tasks.
- 52) Communicate ideas clearly in group settings.
- 53) Evaluate team communication effectiveness.
- 54) Demonstrate accountability in collaborative work.

12. Final Assessment Project

Objective: *Students will complete a final assessment project by creating, presenting, and evaluating a comprehensive technical documentation product for an aerospace or engineering context.*

- 55) Create digital documents, presentations, and technical documentation for a final project.
- 56) Organize information for clear visual, digital, and written delivery.
- 57) Design accessible, readable, and professionally formatted technical content.
- 58) Present technical information clearly to an audience.
- 59) Document aerospace or engineering processes, systems, and procedures accurately.

- 60) Create technical reports or documentation sets that demonstrate course learning.
- 61) Explain system functionality or technical solutions in writing.
- 62) Analyze documentation accuracy, completeness, and usability for intended users.
- 63) Evaluate the effectiveness of the final project based on clarity, professionalism, and audience needs.

13. Leadership

Objective: *Students will develop leadership skills by demonstrating responsibility, collaboration, ethical decision-making, initiative, and professionalism in technical writing and aerospace-related learning environments.*

- 65) Demonstrate leadership behaviors such as responsibility, initiative, and accountability in individual and team tasks.
- 66) Apply effective communication and active listening skills in collaborative settings.
- 67) Analyze how leadership styles and behaviors influence team performance and project outcomes.
- 68) Practice ethical decision-making and professionalism in classroom and workplace scenarios.
- 69) Evaluate personal leadership strengths and identify areas for growth.

14. Work-Based Learning

Objective: *Students will connect classroom learning to workplace expectations by exploring work-based learning experiences, professional behaviors, technical communication practices, and career readiness skills relevant to aerospace and engineering fields.*

- 70) Identify the purpose and value of work-based learning experiences such as internships, job shadows, apprenticeships, and industry projects.
- 71) Demonstrate workplace readiness skills including punctuality, communication, teamwork, and adaptability.
- 72) Apply technical writing and documentation skills to authentic workplace industry tasks.
- 73) Analyze employer expectations related to safety, ethics, and professional conduct in aerospace and engineering settings.
- 74) Reflect on work-based learning experiences to evaluate career interests, skill development, and next steps.

15. Career and Technical Student Organizations

Objective: *Using the [CTSO Resource Document](#), chapter activities will provide some of the best opportunities CTSO members will have to learn by doing. A successful [program of work](#) creates a positive learning atmosphere in the classroom. CTSO members learn how to accept responsibility, work as a team, manage a budget, and handle success and failure. Per the CTE Admin Handbook, CTSOs are embedded into curriculum.*

Professional Development

Prepare each member for entry into the workforce and provide a foundation for success in a career. Becoming a professional does not stop with acquiring a skill, but involves an increased awareness of the meaning of good citizenship and the importance of labor and management in the world of work.

Community Service

Promote and improve goodwill and understanding among all segments of the community through services donated by CTSO chapters, and to instill in its members a lifetime commitment to community service.

Business and Industry Connections

Increase awareness of quality job practices and attitudes, and increase the opportunities for employer engagement and eventual employment.

Financial Leadership

Plan and participate in activities to allow all members to carry out the chapter's projects. Educate members on their own personal finance for current and future success.

Public Relations

Make the general public aware of the good work that students in career and technical education are doing to better themselves and their community, state, nation, and world.

Social Activities

To increase cooperation in the school and community through activities that allow CTSO members to get to know each other in something other than a business or classroom setting.

Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc)

[CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Note: Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.

Reading, Writing and Communicating Crosswalk

Course: Technical Writing

Colorado Academic Standards – Reading, Writing, and Communicating

Standard	Prepared Graduate Competency	Description	Course Evidence / Alignment
Standard 1: Oral Expression and Listening	Prepared Graduate 1 – Collaboration	Collaborate effectively as group members or leaders.	Technical writing includes peer review, collaborative writing, giving and receiving feedback, and group revision/editing tasks related to aerospace procedures, reports, and technical documents.
Standard 1: Oral Expression and Listening	Prepared Graduate 2 – Oral Presentations	Deliver effective oral presentations for varied audiences.	Students present written products or proposals and explain aerospace technical documents, procedures, and design decisions to different audiences.
Standard 2: Reading for All Purposes	Prepared Graduate 4 – Informational Texts	Read a wide range of informational texts.	Students read professional technical documents, including manuals, reports, specifications, maintenance records, and aerospace model texts.

Standard 2: Reading for All Purposes	Prepared Graduate 5 – Language in Context	Understand how language functions in different contexts.	The course emphasizes adapting tone, vocabulary, and structure to audience and purpose, with deliberate stylistic choices for clarity and precision.
Standard 3: Writing and Composition	Prepared Graduate 6 – Craft arguments	Craft arguments using techniques specific to the genre.	Students justify recommendations, write proposals or feasibility studies, and support claims with evidence and logic.
Standard 3: Writing and Composition	Prepared Graduate 7 – Informational Writing	Craft informational/explanatory texts.	This is the primary focus of the course through instructions, technical explanations, reports, maintenance documentation, and aerospace-related communication tasks.
Standard 3: Writing and Composition	Prepared Graduate 9 – Writing Process	Demonstrate mastery of their own writing process.	Students practice planning, drafting, revising, editing, and polishing documents to produce clear, professional final products.
Standard 4: Research Inquiry and Design	Prepared Graduate 10 – Research and Ethics	Gather information from a variety of sources.	Technical writing requires researching accurate information, evaluating sources for credibility, and using information ethically with appropriate citation, especially in safety- focused aerospace and aviation contexts.

Free Resource Links

1. Career Exploration and Postsecondary Opportunities

- CareerOneStop (aerospace careers certifications salary education pathways)
www.careeronestop.org
- AIAA Student Resources (student membership publications aerospace pathways)
www.aiaa.org
- MSU Denver SpaceTech Scholars (Colorado aerospace student support networking scholarships)
www.msudenver.edu
- CCCS Aerospace Industry News (Colorado aerospace programs workforce pathways)
www.cccs.edu

2. Foundations of Technical Writing in Engineering

- NASA Technical Reports Server (aerospace technical reports research documentation examples)
ntrs.nasa.gov
- FAA Technical Library (aviation regulations technical documents standards resources)
www.faa.gov
- NASA LaTeX Docs (technical memo report template documentation structure)
nasa.github.io
- Purdue OWL Technical Writing (technical writing fundamentals organization clarity)
owl.purdue.edu

3. Digital Communication Tools and Platforms

- Google Docs Editors Help (document creation collaboration digital writing tools)
support.google.com/docs
- Microsoft Word Support (formatting editing document design tools)
support.microsoft.com
- Canva Docs (visual document design digital communication tools)
www.canva.com
- Notion (document management collaboration knowledge tools)
www.notion.so

4. Audience Purpose and Professional Tone

- Purdue OWL Audience Analysis (audience awareness communication tone strategies)
owl.purdue.edu
- MindTools Communication Skills (professional tone audience adaptation)
www.mindtools.com
- Grammarly Writing Resources (tone clarity readability communication)
www.grammarly.com/blog
- Harvard Business Writing (professional tone workplace communication)
hbr.org

5. Technical Writing Formats and Document Types

- Purdue OWL Workplace Writing (reports memos instructions formatting)
owl.purdue.edu
- Microsoft Templates (technical documents reports templates examples)
templates.office.com
- Technical Communication Center (technical documents formats examples)
www.instructionalsolutions.com
- Smartsheet Templates (business reports and documentation templates)
www.smartsheet.com

6. Research Information Literacy and Source Use

- Google Scholar (research sources academic technical information)
scholar.google.com
- Purdue OWL Research Guide (research writing citation formatting sources)
owl.purdue.edu
- Colorado State University Writing Studio (research process evaluation sources)
writing.colostate.edu
- EasyBib Citation Guide (citations formatting research sources)
www.easybib.com

7. Technical Description and Process Writing

- FAA Technical Library (procedures manuals maintenance documentation reference)
www.faa.gov
- NASA Technical Reports Server (process descriptions system documentation examples)
ntrs.nasa.gov
- Aerodata Aviation Documents Overview (aircraft manuals procedures documentation types)
aerodata.ai
- Purdue OWL Instructions Writing (procedural writing organization clarity)
owl.purdue.edu

8. Visual Communication and Data Representation

- Canva Charts (data visualization charts graphs communication tools)
www.canva.com
- Tableau Public (data visualization graphs dashboards tools)
public.tableau.com
- Google Sheets Charts (data graphs visualization tools)
docs.google.com
- Datawrapper (charts and graphs technical communication visuals)
www.datawrapper.de

9. Editing Revising and Document Quality

- Grammarly (editing proofreading writing quality tools)
www.grammarly.com

- Hemingway App (readability clarity editing tool)
hemingwayapp.com
- Purdue OWL Editing (editing revising proofreading strategies)
owl.purdue.edu
- ProWritingAid (editing grammar analysis improvement tools)
prowritingaid.com

10. Ethics Intellectual Property and Digital Responsibility

- Creative Commons (copyright licensing intellectual property use)
creativecommons.org
- Purdue OWL Plagiarism Guide (ethical writing citation practices)
owl.purdue.edu
- Copyright.gov (intellectual property copyright laws overview)
www.copyright.gov
- Common Sense Education Digital Citizenship (ethical technology use responsibility)
www.commonsense.org

11. Collaboration and Team Communication

- Google Workspace (collaboration communication shared documents tools)
docs.google.com
- Slack (team communication collaboration messaging tools)
slack.com
- Microsoft Teams (collaboration communication project workspaces)
www.microsoft.com/teams

12. Final Assessment Project

- Canva Presentations (digital presentation design tools communication)
www.canva.com
- Google Slides (presentation tools digital communication design)
slides.google.com
- Prezi (interactive presentation tools visual storytelling)
prezi.com
- Adobe Express (digital content publishing design tools)
www.adobe.com/express
- NASA Technical Reports Server (engineering documentation reports aerospace systems examples)
ntrs.nasa.gov
- FAA Technical Library (aviation manuals guidance technical publications)
www.faa.gov
- AIAA Student Publications (aerospace standards publications design resources)
www.aiaa.org
- Guidelines for Technical Reports in Aerospace Engineering (report structure formatting professionalism)
www.sjsu.edu

13. Leadership

- Lead4Change (student leadership teamwork communication goal setting)
lead4change.org
- Overcoming Obstacles (decision-making communication life skills leadership)
www.overcomingobstacles.org
- TEEN TRUTH Student Leadership Activities (student leadership activities motivation service)
teentruth.net/student-leadership-activities
- MindTools Leadership Skills (leadership communication teamwork problem solving)
www.mindtools.com

14. Work-Based Learning

- CareerOneStop Internships (internships workplace experience job search career readiness)
www.careeronestop.org
- Chicago Public Schools Work-Based Learning Toolkit (job shadow internships site visits career exploration)
www.cps.edu
- University of Colorado Boulder Career Services (career readiness internships resumes interview skills)
www.colorado.edu/career
- Apprenticeship.gov Apprenticeship Finder (apprenticeships work-based learning career pathways)
www.apprenticeship.gov



Technology Student Association – National Competitive Events

STEM Mass Media

Objective: *Students will research, write, produce, and revise STEM-focused news content that informs a public audience in alignment with TSA STEM Mass Media competition requirements.*

- Research the annual STEM Mass Media theme and identify the key information needed for an informative news story.
- Write clear, accurate, audience-centered news copy that summarizes technical information for a general audience.
- Produce a digital news broadcast that presents the annual topic in an original and professional manner.
- Organize information using journalistic structure, concise wording, appropriate tone, and effective transitions.
- Develop interview questions and gather relevant information from a briefing or press-conference format.
- Write a digital news article that synthesizes background information, interview details, and evidence.
- Evaluate the final media product using TSA criteria for accuracy, organization, creativity, communication, and technical quality.

Resources

- Technology Student Association – STEM Mass Media competition guidelines
<https://tsaweb.org/competitions-programs/tsa/themes-problems>
- Purdue OWL – Journalism and technical writing resources
<https://owl.purdue.edu/>
- NPR Training – Audio, interviewing, and journalism guidance
<https://training.npr.org/>
- Canva – News graphics and presentation design tools
<https://www.canva.com/>



Technology Student Association – National Competitive Events

Debating Technological Issues

Objective: *Students will research, document, organize, and defend evidence-based arguments about technological issues in alignment with TSA Debating Technological Issues competition requirements.*

- Research the annual debate topic and related subtopics from credible sources.
- Prepare a one-page summary of references using MLA format according to TSA competition requirements.
- Develop evidence-based pro and con arguments for multiple technological issue subtopics.
- Organize claims, evidence, reasoning, cross-examination questions, and rebuttal points for timed debate rounds.
- Use concise, clear, and persuasive language appropriate for a formal debate setting.
- Respond to opposing arguments through questioning, analysis, and rebuttal.
- Evaluate debate performance using TSA criteria for research, argument quality, communication, reasoning, and professionalism.

Resources

- Technology Student Association – Debating Technological Issues competition guidelines
<https://tsaweb.org/competitions-programs/tsa/themes-problems>
- Purdue OWL – MLA Formatting and Style Guide
<https://owl.purdue.edu/owl/researchandcitation/mlastyle/mlaformattingandstyleguide/>
- National Speech & Debate Association – Debate resources
<https://www.speechanddebate.org/>
- ProCon.org – Background research on public issues
<https://www.procon.org/>



Technology Student Association – National Competitive Events

Future Technology and Engineering Teacher

Objective: *Students will create a professional teaching portfolio, lesson plan, instructional activity, and presentation/interview that communicate a technology or engineering concept in alignment with TSA Future Technology and Engineering Teacher competition requirements.*

- Research a technology or engineering education topic connected to STEM initiatives and technological literacy standards.
- Write a complete lesson plan that includes instructional purpose, standards alignment, learning activities, and assessment components.
- Develop supporting handouts, assessments, or classroom materials that communicate the lesson clearly to the intended audience.
- Organize a portfolio that documents the lesson plan, activity materials, resources, references, and teaching rationale.
- Apply reader-centered technical communication principles to make instructional materials clear, usable, and accessible.
- Present the lesson activity to judges and explain instructional decisions during the interview.
- Evaluate the portfolio and presentation using TSA criteria for lesson-plan quality, organization, resources, creativity, communication, and professionalism.

Resources

- Technology Student Association – Future Technology and Engineering Teacher competition guidelines
<https://tsaweb.org/competitions-programs/tsa/themes-problems>
- International Technology and Engineering Educators Association – Standards and technology education resources
<https://www.iteea.org/>
- Purdue OWL – Technical writing and professional communication resources
<https://owl.purdue.edu/>
- Canva – Handouts, instructional materials, and presentation design
<https://www.canva.com/>