Engineering 183EW

Engineering and Society

*Course Manual & Survival Guide*

Summer, 2017

School of Engineering and Applied Science

University of California, Los Angeles

**Preface**

This *Survival Guide* brings together in one document the various forms of guidance we provide the students in Engineering 183EW, so you will know better what we expect of you and how you can best fulfill those expectations. Our objective is to help overcome the unfamiliarity many students have with written and oral report presentation, with library research and citation of references, with working together in teams, and with the other special requirements of this course. The *Course Manual & Survival Guide* is distributed at the first week of class. We hope that it will prove useful. If you have any questions or suggestions for improvement, please do not hesitate to bring them to your Teaching Assistant or to one of the course Lecturers.

*Gershon Weltman*

*Donald G. Browne*

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**1. Course Description**

**1.1 Catalog Description**

Lecture, four hours; discussion, three hours; outside study, five hours. Limited to sophomore/junior/senior engineering students. Professional and ethical considerations in practice of engineering. Impact of technology on society and on development of moral and ethical values. Contemporary environmental, biological, legal, and other issues created by new technologies. Emphasis on research and writing within engineering environments. Writing and revision of about 20 pages total, including two individual technical essays and one team-written research report. Readings address technical issues and writing form. Satisfies engineering writing requirement. Letter grading.

**1.2 Objectives of the Course**

* To better prepare UCLA’s engineering students to understand and deal with the social and ethical issues they will face as professional engineers and as citizens of a technology dependent democracy.
* To increase awareness and knowledge of the impact of technology and engineering on society, historically and at present.
* To introduce contemporary moral and ethical principles and provide an historical perspective on their origins and evolution, including the contributions of science, engineering and technology to this evolution.
* To introduce contemporary societal issues involving technology, to promote a critical and informed assessment of them and to encourage continued education in this direction.
* To provide guidelines for dealing with ethical factors in the context of the individual, team, project, corporate and societal environments that surround the practice of engineering.
* To improve the ability of the students to work together on multi-disciplinary teams, as they undoubtedly will in professional practice.

**1.3 Fulfilling Requirements and Engineering Educational Goals**

This course is directed specifically toward fulfilling a number of requirements of the Accreditation Board of Engineering and Technology (ABET). ABET is the recognized U.S. accreditor of college and university programs in applied science, computing, engineering and technology. The [ABET accreditation](http://www.abet.org/the_basics.shtml) process ensures the quality of the university education students receive. The ABET engineering school outcomes that are fully or partially met by Engineering 183EW are:

* An ability to function on interdisciplinary teams (3d)
* An understanding of professional and ethical responsibility (3f)
* An ability to communicate effectively (3g)
* The broad education necessary to understand the impact of engineering solutions in a global and societal context (3h)
* A recognition of the need for, and an ability to engage in life-long learning (3i)
* A knowledge of contemporary issues (3j)

The National Academy of Engineering (NAE) also has called for increased educational attention to the subject of Engineering Ethics (see *The Bridge*, vol. 32, number 3, Fall 2002, an issue devoted entirely to the subject). This is not because engineers are particularly unethical; it is because the problems engineers will deal with in the 21st Century will necessarily involve a variety of societal and ethical as well as technological issues. NAE identifies the need for education regarding “macro ethics” (broad social and environmental issues) as well as “micro ethics” (dilemmas faced by individual engineers), and suggests a curriculum that includes a required course in ethics plus recognition of its importance throughout the curriculum.

A number of first-rank Schools of Engineering have accordingly increased their emphasis and curriculum content in the area of ethics. Offerings range from faculty development initiatives aimed at incorporating ethics material into a broad range of classes (e.g., at the University of Michigan), the introduction of new dedicated courses (e.g. at UC Berkeley, where the course has been taught jointly with Letters & Science), and both approaches together (e.g., at the University of Virginia School of Engineering, where all students take a four-course science, technology and society core, along with required senior theses on the social impact of technical projects). At the UCLA School of Engineering, we have elected to provide a dedicated course that covers engineering ethics within the broad scope of engineering and societal interactions.

**1.4 Course Modules**

Following an introductory session, our Engr 183EW course proceeds through three main modules:

***1. Historical Background***

***2. Contemporary Issues***

***3. Ethical Engineering Practice***

These modules are described individually below.

**Historical Background Module** – This portion of the course covers key events and their meanings in the history of technology and the related evolution of moral and ethical values and philosophy, focusing on the scientific and industrial revolution and the twentieth century. Modern technologies and their social and cultural impact are accentuated, and their ethical correlates emphasized.

**Contemporary Issues Module** – This portion of the class delineates and explores the major social issues, rooted in technology, that confront us in the 21st Century. The focus is on the technological, social, moral and ethical dilemmas that are facing today’s and tomorrow’s engineers. The individual subjects are selected so as to provide a broad view of the effect of technology on creating and solving social problems, an understanding of how our “non-technical” people view scientists and engineers and an understanding that the solutions to these problems require a rational amalgamation of technical and cultural considerations. The presentations discussions are designed to include: the facts of the matter; information and misinformation in the popular press; technologies that help provide greater understanding of the issue; technologies that might ameliorate the issue, and potential and/or feared undesirable side effects; the effectiveness (or not) of conservation; cultural, political, moral and ethical considerations.

**Ethical Engineering Practice** – This integrating and summarizing module describes what an engineer can actually expect to face professionally, and how the considerations treated above can influence his or her work content and actions. Major topics include.

* *Ethics in the modern workplace.* Exploration of personal, professional, corporate and social ethical concepts, including the value of personal integrity, the preservation of truth in research and the role of relationships in career development. The Codes of Ethics of Professional Engineering Societies will be examined and critiqued. Case studies of common dilemmas will be analyzed and discussed.
* *Engineering projects and the particular ethical and moral dilemmas they present.* As background and framework, the project environment will be delineated, including: the definition of a project; issues of teamwork; effects of diversity including generational, gender, ethnicity, culture, etc.; project management methodologies; and the use of computers in the modern project. The ethics of teamwork, of management and of leadership will be discussed. The hierarchical nature of moral judgments will be explored. Methodologies for risk assessments incorporating ethical values into engineering decision making will be presented.
* *The responsibilities of engineers as individuals and of the engineering profession as a whole in a modern society.* This will include: the engineer as guardian of the public health and safety; when whistle blowing is in order; the concept of sustainable development, and its application in engineering endeavors. The major goal of “being ethical” versus the sub-goal of “having ethics”. What the individual engineer can do in terms of formal and informal education, practice and analysis to help achieve the former.

**Case Studies**

During the course a number of engineering ethical case studies are examined in some detail. These will vary depending upon the detailed module content. Typical cases are the Space Shuttle *Challenger* and *Columbia* disasters, the McDonnell Douglas DC-10 failures, the Ford Explorer rollover cases, etc. In some sessions the participating faculty will bring explicit cases from their personal experience to review and discuss. In addition, one session is devoted to job-related problems in engineering ethics of the type likely to be encountered immediately by young engineers.

**1.5 Student Participation and Teamwork**

We believe students are more motivated, and therefore learn more, when they are involved rather than simply listening. Accordingly, the Engr 183EW course includes considerable content that is generated by the students themselves, both in individual research and reporting assignments and in one major team effort.

In the team efforts students are assigned a contemporary issue to research, using both library and Internet resources. They will then report: (1) the technological facts and reality regarding the selected issue; (2) the societal and ethical issues involved; and (3) a team consensus on recommended actions by appropriate parties to ameliorate or mitigate the condition, including how technology and engineering will help to accomplish the recommendations within ethical guidelines.

* 1. **Class Meeting Time**

The class is scheduled to meet 8-9:50 am on Monday, Wednesday, and occasionally Fridays, with discussion sections scattered throughout the week. We realize that this is early, but it was established by the Student Affairs Office in order to avoid conflicts with core courses in the engineering departments.

* 1. **Discussion Attendance**

Attendance in the discussion section is mandatory. In keeping with campus policy regarding attendance in Writing II classes, a second unexcused absence will result in a failing grade in the class.

* 1. **Turnitin**

We use Turnitin both as a method of identifying work that is not a student’s own, but also as a formal mechanism to save students’ work for possible examination during the School’s accreditation visit. For these reasons, it is imperative that all written work be submitted to Turnitin in a timely manner.

**Turnitin: Read Carefully**

Some notes about using Turnitin in Engr 183EW:

Although the “Due” date on all assignments will read on Fridays, an assignment is due electronically the same day the paper copy is due in discussion. We use the end-of-the-week date so as to not have to keep reopening Turnitin and change the due dates for individuals who forgot to turn the assignment in when it was due.

An assignment must be present in Turnitin in order to receive a final grade or credit for that assignment.

All Turnitin submissions must be in either .doc (or .docx) or .ppt (or .pptx) format. No exceptions. No .pdf,, or .rtf, files, please. And please do not use Google slides for your presentation slides – material in Google slides cannot be saved to Turnitin without serious corruption problems. We will reject material submitted in any format other than .doc (or .docx) or .ppt (or .pptx) format.

* 1. **Paper Submission**

In your discussion section, you will submit paper copies of your assignments (except for the Autobiography (this week) and the Final Team Report – which is due the first day of final examinations.

All papers should have the following printed heading (no illegible handwritten headings will be accepted):

Name

Discussion Section

Date

Please note that Microsoft Word will not put your name on your paper. You have to do it yourself.

* 1. **Summer Session, 2017 Course Contacts**

Instructors: Gershon Weltman

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**Contact for *all* administrative matters and essay/report guidance**

**2. Course Syllabus and Schedules**

**2.1** **Course Content**

Engineering 183EW constitutes the following elements:

* 17 lectures
* Textbook Reading and Supplemental Articles
* Weekly Discussion Section (mandatory attendance)
* 3 Individual Writing Assignments
* Team Research Project with Oral Presentations and Written Report
* Examinations
  + Midterm (2 hours)
  + Final (3 hours) [in two parts]

**2.2 Grading Percentages**

The elements that make up the student grade, and their relative contribution, are:

* Examinations 37%
  + Midterm 14%
  + Final 23%
* Individual Essays 24%
* Team Research Paper 24%
* Team Oral Presentation 5%
* Participation 9%
* Completion of Student Evaluation at end of quarter 1%
* Total 100%

Individual assignments are generally graded on a 0-100 point basis, and are then combined in proportion to the above weights. Final letter grading (A+, A, A-, B+, etc) is on an absolute basis and not on a curve, with the cutoff points determined collaboratively by the lecturers and teaching assistants.

***All assignments (see the turn-in Check List, page 61 for a full list) must be completed in order to pass the class. In addition, it is required that every Team member fully participate in the team effort.  If it is determined that a student is not participating fully, we reserve the option of having that student not share in the Team grade.***

**2.3 Course Web Site**

The Engr 183EW class site at https://ccle.ucla.edu gives access to posted class materials – including descriptions of assignments at the time of assignment and the most of the lecture slides following each lecture – and provides for uploading of completed class assignments.

**2.4 Lecture and Assignment Schedule**

This quarter’s schedule of lectures and associated reading assignments in van de Poel and Royakkers’ *Ethics, Technology, and Engineering: An Introduction* are given on the following page. This schedule does *not* include the dates of the weekly discussion section meetings, attendance at which is mandatory.

**Engr 183EW - Engineering and Society**

**Summer 2017 Lecture and Reading Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lecture Number** | **Date** | **Lecture Topic** | **Van de Poel & Royakkers** | **Additional Reading** |
| **Module 1 Foundations** | | | | |
| 1 | M Jun 26 | Introduction and Overview | Introduction  Chapters 1-4 | G. Orwell |
| 2 | W Jun 28 | Bases of Morals & Ethics |
|  | F Jun 30 | Library Research |
|  | M Jul 3 | Floating Holiday |
| 3 | W Jul 5 | Ethical Philosophies |
| 4 | F Jul 7 | Effective Teams & Leadership |
| 5 | M Jul 10 | The Process of Industrialization |
| 6 | W Jul 12 | Building the Information Age |
| 7 | F Jul 14 | Ethical Case Studies I | Chapter 6-9 |
| 8 | M Jul 17 | Ethical Case Studies II | G. Hardin |
|  | W Jul 19 | Midterm Examination |
| **Module 2 Contemporary Issues** | | | | |
| 9 | M Jul 24 | Population Growth & Resources |  |  |
| 10 | W Jul 26 | Engineering the Environment |
| 11 | F Jul 28 | Engineering the Biosphere |
| 12 | M Jul 31 | Computing and Society I |
| 13 | W Aug 2 | Computing and Society II |
| 14 | F Aug 4 | Engineering and the Military |  |  |
| **Module 3 Ethical Engineering Practice** | | | | |
| 15 | M Aug 7 | Ethical Decision Making and Ethical Case Studies III | Review Chapters 1 & 9 |  |
| 16 | W Aug 9 | Engineering Projects and Ethical Case Studies IV |
| 17 | F Aug 11 | Personal Ethics & Going Forward |
|  | M Aug 14 | Team Report Time |
|  | W Aug 16 | Team Report Time |  |  |
|  | F Aug 18 | Final Examination |  |  |

**3.0 Examinations**

**3.1 Overview**

We give two examinations in the course:

1. Midterm Exam, given during the fourth week: Wednesday, July 19, 2017.

2. Final Exam: Friday, August 18, 2017 (in class)

**3.2 Purpose**

The primary objective of the examinations is to show that the student has access to information about and an understanding of the impact of engineering solutions and their ethical implications in a global and societal context. Consequently, the Midterm and Final Examinations draw their questions from the lectures and the text, both of which emphasize the impact of engineering solutions in a global and societal context. In particular, the lectures include both the historical impact of engineering, with special attention to the Industrial Revolution and the 20th century. These lectures include societal impacts of engineering frequently neglected in such courses, that is, the direct impact of technology and rapid technological growth on design movements and on popular art and literature as well as on social criticism. The major focus is on the current impact of engineering in such critical global and societal areas as population growth and resource pressure, environmental engineering, bio-technical engineering, computing and military engineering.

**3.3 Sample Examination Questions**

Sample examination questions will be discussed in discussion during the fourth week of classes.

**4.0 Writing Assignments**

**4.1 The Need for Good Engineering Writing**

Engineering 183EW requires a good amount of writing, possibly more than you have experienced before. We do this because engineers are expected to write in their professional capacities all through their careers. Bower (1985), in an MIT thesis on technical communication within the industrial community, determined that an entry-level engineer will spend approximately one third of his or her time writing or preparing to write (reading background material, etc.), and the percentage of time devoted to writing only increases with increasing responsibility within an engineering organization.

Bower provides the following quotations about the necessity of communication skills within the engineering community:

“New employees with good writing skills do not waste productive time learning the basics on the job.”

“Well-written reports increase an employee’s visibility and chances of recognition.”

“The quality of a communication had a strong impact on an idea’s reception and implementation.”

“Well written documents increase a company’s image and prestige.”

“Writing ability often correlates with a superior manager’s characteristics, such as the capability to synthesize and clarify in complex situations.”

“The quality of communication has a strong impact on an idea’s reception.”

“Poor proposals and reports mean little or no future work with clients.”

“Young engineers who write with clarity and make logical presentations tend to become supervisors of other engineers within 5 years of graduation.”

“A person got more visible work done because she finished reports quickly, leaving more time for other work.”

“Oral skills are more important to ‘power seekers,’ but good writing helps the few craftsmen who are left.”

“A man was forced to resign because the research reports he wrote were poor, even thought the quality of his work was very good.”

Engineering employers have indicated, on a nationwide scale, that the present generation of engineering graduates comes unprepared to write within the workplace. Theodore C. Kennedy, a practicing engineer, noted the following in an address before a meeting of the National Academy of Engineering in Washington, D.C. (Kennedy, 2006):

We have to change what we expect from engineers, and we have to turn out graduates with broader skills, interests, and abilities. With the commoditizing of basic design engineering and the migration of that function overseas, the traditional training ground for recent graduates is no longer available in the United States. Young engineers now have to move up to design leader and managerial positions much faster. The learning curve is getting steeper.  
  
When I hire someone today, I look for different skills than I did 10 years ago. Today, it is not unusual for good candidates to have global references and experience on projects and assignments around the world. I think we must prepare our graduates for that type of career, because they aren’t likely to spend their careers working in one company, or even in one country. And they must become advisors, consultants, managers, and conceptual planners much more quickly than they did a few years back.  
  
This is true even for my business in the smokestack industries. Today, I need Georgia Tech, the University of Texas, and other educational institutions to turn out graduates who are mature and have more than professional engineering skills. I need graduates who know something about working with others—not just teamwork, which is a given—but a basic understanding that our culture is not the only one around. I need graduates who can speak before an audience to make a point, either to me or to a client. Comfortable or not, engineers today are constantly selling—selling an idea, a concept, a study, an alternative, or just the need for a new document-control system.  
  
Engineers must be prepared to write reports, studies, or routine business letters better than most can today. I have largely given up on teaching engineers to write succinctly, concisely, and clearly. I am tired of cite, sight, and site being used interchangeably. I used to send my engineers to classes, but now I have a report review team of English majors. And the situation has gotten worse with the advent of e-mail. Now we don’t even write in complete sentences.  
  
But, most important, I want employees who can analyze—analyze problems, situations, ramifications, upside and downside, near-term and long-term effects. The ability to analyze is a defining quality of new hires and of the employees I retain. I want my employees to ask the next questions: “Why is that so? Are you sure? What fact is that based on?”

We’ll give the final word on the importance of writing to Randy Cohen, who for many years wrote “The Ethicist” column in the *New York Times Magazine* every Sunday.

*I prescreen job applicants for a small engineering consulting firm committed to equal opportunity. These jobs are primarily technical, but English-language skills are required for the technical writing involved, and a writing sample is requested. Many applications are full of errors in grammar, spelling and punctuation, and are summarily rejected. This disproportionately affects applicants whose names suggest that English may be their second language, as well as other minority groups. Is it ethical to reject engineering applicants for their writing skills? J.W., PENNSYLVANIA*

Because clear and accurate writing is a significant part of the job, it is legitimate to eliminate applicants who demonstrate an inability to provide it. But don’t stop there.

Your admirable commitment to equal opportunity can be reconciled with your determination to maintain high professional standards. There is no shortage of minority candidates with good writing skills; you should make sure those folks are aware of this job opening by broadening your search to take in, for example, historically black colleges and universities. You can reach out to organizations involved in training and finding jobs for those for whom English is a second language. You can recruit women, sometimes underrepresented in engineering firms. You can help lower-level employees within your own organization gain the skills they need to advance. In addition, if you do reject an otherwise qualified person because his English-language skills are deficient, let him know why, so he has a chance to improve (and not waste his time buffing up his mastery of tango or knitting). What’s crucial is that you are not passive — responding only to those who happen to apply for this job — but take steps to honor both of your laudable values.

UPDATE: After posting on engineering-employment Web sites directed to women, African-Americans and Hispanics, the company found a hire through a more general site, Craigslist. His surname did not announce him as Hispanic, but he turned out to be so and to be bilingual, an asset in this job (Cohen, 2010).

**4.2 Individual Writing Assignments**

We give three individual writing assignments in Engr 183EW; they are:

* + 1. An ungraded biographical essay, discussed below.
    2. Selected Ethical Case Study, assigned the 1st week.
    3. Analysis of Current Environmental Situation, assigned the 4th week.

The student is expected to submit a double-spaced essay of 11 pt type for each assignment. The expected length is discussed in each assignment. The student must read the actual assignment carefully before beginning work.

**4.2.1 Purpose**

The main purpose of the three individual essay assignments is to evaluate and improve the student’s ability to communicate effectively in writing -- a skill essential for engineers at all professional levels and in all technical areas. This objective is also addressed by the Team Research Project Report and by the midterm and final examinations, which require essay answers. Practice in oral communication is provided by the Team research oral presentation.

In addition, the individual essays are intended to demonstrate an understanding of professional and ethical responsibility. For example, the initial biographical essay requires discussion of one's own ethical back ground, while the second and third writing assignments require discussion of ethical issues resulting from a specific current event and an engineering ethics case study of the student's choosing, respectively.

**4.2.2 The Revision Process & Grading**

Each individual paper should be prepared as you would if you were a professional engineer submitting a paper to an employer or a technical journal. Your teaching assistant will review the paper as if he or she was a peer reviewer for a technical journal, substituting our grading criteria (see the grading matrices on pages 13-14) for a technical review. The paper will be given a conditional grade. In addition, if in the opinion of your teaching assistant your paper does not reflect a professional level of preparation (such as the paper consisting only of an outline with no supporting reference material), the teaching assistant may reject the paper summarily. In this case, it is up to the TA’s discretion whether a revised paper will be accepted; if one is accepted, the TA may grade the resulting paper lower than if it had been submitted in a timely manner. An individual writing assignment may be returned to the student for rewriting if any element of the essay is determined to be below the standards that we expect of UCLA students.

Upon the return of the paper to you, you should revise the paper in accordance with the TA’s suggestions. If a significant amount of effort was expended in preparing the paper in the first place, revisions may be minimal. If not, a significant rewrite may be necessary.

On the submission of the revised paper, your teaching assistant will assign a final grade to the revised paper.

**4.2.3 Guidance and Grading**

As with virtually all of the course assignments, grading is based on multiple criteria:

* Did the student address the actual question or issue at hand?
* Is the answer well organized and complete? If there are sub-sections, are all of these identified and covered?
* Is the essay logically and competently written? Is the student’s point of view clearly expressed? Is the writing grammatical and free of spelling and other errors?
* Are there a sufficient number of references (where these are required) and are they of sufficiently high quality? As Engr 183EW is an upper division class, we expect research-quality references, not one and two page web pages written for seventh grade students. Papers without or with insufficient references will not be reviewed or graded.
* Reference format should follow the instructions in Section 7).
* Does the essay show original and/or creative thought?
* Is the presentation professional looking and confidence building?

Typical grading matrices are included on pages 13-14.

**Grading Rubric for Ethical Case Study Postmortem**

**Rating Scale:**

4 = Excellent: *outstanding, inspired* thought and/or communication—far beyond merely adequate.

3 = Good: sufficient in all criteria but not extraordinary; very few errors of reasoning or written expression.

2 = Fair: meets the basic expectations for the assignment, but there are often problems with the argument, reasoning, structure, and/or writing.

1 = Poor: barely meets the most basic expectations for the assignment; shows only a slight semblance of coherence in structure, argument, and written expression.

0 = Completely unacceptable: fails to demonstrate basic expectations for or even understanding of the assignment.

|  |  |
| --- | --- |
| **Grading Criteria** | **Rating (0-4)** |
| **Introduction / Thesis**   * Introduction contains the problem statement and thesis; provides sufficient background material; defines important terms; orients reader to the rest of the paper. * Clearly stated thesis outlines topic focus and ethical argument. * Thesis serves as the controlling idea for the rest of the paper. |  |
| **Adhered to the assignment**   * Comprehensive and clear analysis of the major issues surrounding the engineering failure. * Thorough discussion of available courses of action and constraints on decision-makers. * Highlights ethical issue(s) involved in the case. * Explains and clearly applies appropriate ethical principle to the case. * Presents possible solutions that exhibit critical, creative, and rational thinking. |  |
| **Research / Sources**   * *Relevant* sources are used appropriately—i.e., to reinforce a point the writer is making or to provide background and context on the case. * Summaries/paraphrases/quotes of sources are well-integrated with the rest of the paper (i.e., smoothly presented and commented upon). * All research is cited appropriately in the text using the correct format (i.e., parenthetical citation) and all sources are in the correct format in the References List. |  |
| **Organization / Exposition**   * Paper is logically and intelligently organized to fit the progression of the argument. * Paragraphs have clear, focused points that support the argument of the exploration of the problem. * Paragraphs are well-developed—they advance the argument by making good claims, using good evidence, and commenting on the significance of the evidence to support the claims. * Sentences, paragraphs, and sections of the paper progress logically and smoothly to build the argument. |  |
| **Conclusion**   * Summarizes argument and main points while avoiding redundancy. * Provides closure to the paper and makes reader aware of the broader context of the paper’s discussion. * Answers the question of why the argument matters. |  |
| **Grammar / Style**   * Paper is highly readable—sentences and paragraphs are clear and concise; word choice is precise. * Paper is free of serious problems with grammar, punctuation, or spelling that might disrupt communication between the reader and the writer. |  |
| **Overall Assessment** | **Grade:** |

**Grading Rubric for “Tragedy of the Commons” Essay**

**Rating Scale:**

4 = Excellent: *outstanding, inspired* thought and/or communication—far beyond merely adequate.

3 = Good: sufficient in all criteria but not extraordinary; very few errors of reasoning or written expression.

2 = Fair: meets the basic expectations for the assignment, but there are often problems with the argument, reasoning, structure, and/or writing.

1 = Poor: barely meets the most basic expectations for the assignment; shows only a slight semblance of coherence in structure, argument, and written expression.

0 = Completely unacceptable: fails to demonstrate basic expectations for or even understanding of the assignment.

|  |  |
| --- | --- |
| **Grading Criteria** | **Rating (0-4)** |
| **Introduction / Thesis**   * Introduction contains the problem statement and thesis; provides sufficient background material; defines important terms; orients reader to the rest of the paper. * Clearly stated thesis outlines topic focus and analysis/argument. * Thesis serves as the controlling idea for the rest of the paper. |  |
| **Adhered to the Assignment**   * Clear and concise summary of Hardin’s “The Tragedy of the Commons.” * Concepts from Hardin are chosen appropriately and explain clearly. * Hardin concepts are used to analyze and understand the specific problem. * Presents possible solutions, again using concepts from Hardin as an analytical tool. These exhibit critical, creative, and rational thinking. |  |
| **Research / Sources**   * *Relevant* sources are used appropriately— i.e., to reinforce a point the writer is making or to provide background and context on the case. * Summaries/paraphrases/quotes of sources are well-integrated with the rest of the paper (i.e., smoothly presented and commented upon). * All research is cited appropriately in the text using the correct format (i.e., parenthetical citation) and all sources are in the correct format in the References List. |  |
| **Organization / Exposition**   * Paper is logically and intelligently organized to fit the progression of the argument. * Paragraphs have clear, focused points that support the argument of the exploration of the problem. * Paragraphs are well-developed—they advance the argument by making good claims, using good evidence, and commenting on the significance of the evidence to support the claims. * Sentences, paragraphs, and sections of the paper progress logically and smoothly to build the argument. |  |
| **Conclusion**   * Summarizes argument and main points while avoiding redundancy. * Provides closure to the paper and makes reader aware of the broader context of the paper’s discussion. * Answers the question of why the argument matters. |  |
| **Grammar / Style**   * Paper is highly readable—sentences and paragraphs are clear and concise; word choice is precise. * Paper is free of serious problems with grammar, punctuation, or spelling that might disrupt communication between the reader and the writer. |  |
| **Overall Assessment** | **Grade:** |

Descriptions of the three writing assignment are:

**4.3.1 Writing Assignment 1 – Informal Biographical Statement**

Through this writing assignment, we seek to get to know you a little bit better. Based upon your expectations of the course, as well as your own ethical experiences, we can better tailor the course to meet your needs. This assignment will normally be completed during the first week of class.

We will ask you to provide a short essay identifying yourself, addressing your ethical background, and asking for you to analyze the current diversity within HSSEAS:

1. Situation: How would you describe the SEAS diversity climate in terms of fairness? Supportive? Non-supportive? Neutral? Other? Briefly explain your description.
2. Issues. What parts of the diversity climate and/or of student awareness do your feel could use improvement?
3. Recommendations. Provide one or more specific suggestions for improving the diversity climate in an ethical manner.

Procedure: 2 pages, double spaced.

This essay will be assigned during the first lecture and is due the following Wednesday in class, with an electronic copy submitted to Turnitin by Friday.

**4.3.2** **Writing Assignment 2: Ethical Case Study - Post-Mortem Report**

For the first individual writing assignment, we would like you to examine, in detail, an engineering ethics case study. A list of topics is presented below.

The paper should be 2500 words (minimum) in length plus the bibliography, although you are welcome to write more if you wish. Your best beginning sources will probably be the pages of the New York *Times*, the Los Angeles *Times*, and news magazines such as *The Economist* and *Time.* In some cases, significant papers have appeared in technical journals or books on the older cases. Please see Mr. Browne if you’re having problems finding material.

A postmortem is a common task in engineering. It formalizes the process of learning from past experience. The post-mortem analyzes a project once it has ended and identifies what went well and what went poorly to improve the next project. This writing assignment asks you to write up a post-mortem of a well-known case of engineering failure, including not only the technical details of the failure but the ethical lapses that contributed to the failure.

The Writing Task -

Your post-mortem write up should explain how ethical lapses contributed to the engineering failure. Describe the actions, as an engineer, that should be taken (should have been taken) to come to grips with the failure, utilizing one of the ethical frameworks you have learned about as a guide in influencing or determining your course of action. Describe the advantages and disadvantages of the actions you propose and provide justification using one of the ethical frameworks as a guideline in the analysis process.

Audience –

Identify an audience for your post-mortem write up – this can be either a government regulatory agency such as the NTSB or the FDA, the company’s board of directors, etc. – and write your post-mortem analysis to that audience, including information and analysis that would be of most interest and of most use to them. The audience you are addressing must be clearly specified in your paper.

Researching and Analyzing the Case -

Choose one of the cases of engineering failure most related to your future career or professional interests. First, read about the case and understand the complex issues surrounding the case, including the parties in the case (corporate, government, etc.) and the various components including engineering, management, regulatory, socio-technical and ethical. Second, decide what the major issues surrounding the engineering failure are. Also, consider which of the ethical frameworks you have learned best explains the ethical lapses in this engineering failure case.

Your postmortem should follow this structure:

1. **Abstract**: A short summary of the engineering failure, its consequences, why it happened, and what should be done to prevent future problems. Your abstract should also clearly identify your ***audience***. This can be either a government oversight committee, a company’s board of directors, etc. Be sure that you write your postmortem to that specific audience, including information and analysis that would be of most interest and use to them. DO NOT begin to work on the Abstract until you have finished the first submission of the paper (due Week 3).
2. **Background**: The body of your postmortem should begin with a narrative about *what* happened (the engineering failure) and what its consequences were.
3. **The Engineering Failure**: This section should explain what technical, engineering, management, regulatory, and/or other socio-technical factors led to the engineering failure.
4. **Ethical Analysis**: The section should analyze the ethical lapses (i.e. stakeholders’ actions, decisions or interests, principles adopted or flouted, risks ignored and reasons for doing so, etc.) that contributed to the engineering failure. The textbook poses some good ethical questions about the case of the Ford Pinto at the bottom of page 69 and top of page 70. Try to brainstorm similar questions that apply to your own topic, and then answer them using at least one of the ethical frameworks you learned about in class to discuss the engineering failure. Page 95 of the textbook presents an example of how this might be done using Kant’s theories applied to the Ford Pinto case. You might use this model to inspire your own ethical analysis (using duty ethics and/or utilitarianism and/or virtue ethics).
5. **Recommendations**: Drawing on at least one of the ethical frameworks, this section should first propose general ideas and then proceed to very specific recommendations about how to prevent similar failures from occurring in the future. What should have been done? What needs to be done in the future? Don’t make simple arguments (i.e. there needs to be more or better regulations); instead, specify what regulations should be imposed (and by whom), what the parameters of such regulations should be, and how they might be enforced (and by whom). Describe the advantages and disadvantages of the actions you propose and provide justification, again using at least one of the ethical frameworks.
6. **Conclusion**: Your conclusion should address what we have learned (or should have learned) from the engineering failure you discuss. What progress, if any, has been made to prevent similar failures in the future? What remains to be done?

**Common problems with the Ethical Case Study:**

* Application of an Ethical Framework: You must apply a specific ethical framework to your chosen problem. However, before you apply it to your problem, you must give a general explanation of the framework. A good paper will answer the question: Why does this framework apply to the party at fault?
* Ethical Lapses:A listing of the ethical lapses involved in your case study must come after you state your ethical framework. Many students try to get ahead of themselves and start pointing out the ethical lapses early in the paper. You should identify how each ethical lapse violated your chosen ethical framework.
* Solutions – What not to do: Identifying solutions is one of the hardest parts of the essay. What you should ***not*** do is simply state what the party “should” or “should not” have done:

*Example:*The Therac-25 technicians shouldn’t have ignored error messages.

*Example:* Intel should have recalled the defective processor.

*Example:* The Teton Dam engineers shouldn’t have built the dam in the first place.

These “solutions” are painfully obvious, but more importantly, they are not helpful. They are simply opinions.

* Solutions – What to do: Propose a concrete, *specific* solution that will aid adherence to your ethical framework.

*Example:* Intel should force its employees to attend a seminar highlighting the importance of upholding virtues in the company (Virtue Ethics).

*Example:*The Hyatt-Regency Kansas City Hotel engineers [or the Teton Dam engineers] should require independent engineers to perform safety inspections at specific stages of design and construction (Duty/Rights Ethics).

*Example:* The Therac-25 technicians should immediately report error messages and machine malfunctions to AECL authorities, discontinuing treatment until receiving confirmation that the problem has been analyzed and corrected (Duty Ethics).

These examples represent concrete propositions.

Remember, since you proved that violating [ethical framework] ultimately led to failure, then your solution should be aimed at facilitating adherence to [ethical framework].

Logic:

Problem P will occur when X is violated

Stop violating X → Problem P will not occur.

***Engineering Ethics Case Study Topics***

The following is the list of topics for the Ethical Case Studies essays during Summer Session, 2017. Many cases involve more than one discipline. We will post some suggested readings for the cases during the third week of the class so that you will have an easy time beginning your research on the topic that you choose.

***Aberdeen Three*** – Three Army engineers at the U.S. Army’s Aberdeen Proving Ground are prosecuted for allowing hazardous chemical wastes to be illegally stored and released to the environment, in violation of several Federal laws prohibiting such action. [The best place to start for this paper is Parts I and II of Jane F. Barrett and Veronica Clarke, “Perspectives on the Knowledge Requirement of Section 6928(d) of RCRA After United States v. Dee,” George Washington University Law Review, v. 59, p. 862-888. This paper is available through the Lexis-Nexis database at the UCLA Library’s website. If you are having trouble finding it, see Browne.]

***I-35 Bridge (Minneapolis, Minnesota)*** – On August 1, 2007 the I-35 Bridge across the Mississippi River in Minneapolis collapsed catastrophically, killing 13 and injuring 145. The caused was an undersized gusset plate, which was not noticed during the design phase or during repeated inspections. Start with the National Transportation Safety Board’s report.

***Synthes’ Norian XR Bone Cement*** – During the early 2000s Synthes, Inc. introduced a new bone cement (Norian XR) for human use without required clinical trials, in spite of clear evidence of harmful – often fatal – results when used for spinal surgery.

***St. Francis Dam*** – A concrete dam near Los Angeles fails catastrophically on first filling in 1928 due to bad design and construction. [See Browne for a very recent contribution to the literature on this failure].

***Chernobyl*** – A nuclear reactor in Ukraine explodes in 1986 making the local environment uninhabitable and sending a radioactive plume around the globe. Proximate causes include the design of the reactor and improper operation.

***Sevaso*** – An industrial accident in Italy releases a cloud of a potentially carcinogenic material (a dioxin). The cause was inept management of the chemical process.

**Research Sources**

You should use substantial sources such as (but not limited to):

*The Economist*

*The Los Angeles Times*

*Nature*

*The New York Times*

*Scientific American*

*Smithsonian Magazine*

*Time Magazine*

*The Wall Street Journal*

Any scientific or technical journal (such as the ASCE Proceedings, IEEE publications, etc).

You should not use Google or Wikipedia as anything other than a place to find more substantial resources. You will probably find the most important relevant sites in the first twenty or thirty hits on Google, and the list of references in Wikipedia may be more important than the article itself. Nor should you use any small or local newspapers/periodicals unless they are very relevant (e.g. New Orleans’ *Times-Picayune* newspaper would be useful if you were doing a topic related to Hurricane Katrina). And you should not use random websites or blogs—the authors you cite should write with some institutional or governmental authority.

In addition, papers that are obviously student papers from another university should be avoided – quite often the information or analysis is simply wrong. This admonition applies specifically to ethics “papers” from Texas A&M University and Brown University.

A note about accessing authoritative literature is included in the library “Quickstart Guide” on page 48 of this manual.

**4.3.3 Writing Assignment 3 – The Tragedy of the Commons**

**Preparation**

Read Garrett Hardin’s essay “The Tragedy of the Commons” before your discussion section during the fifth week of classes. It would be especially helpful to write an informal summary of the paper as you read it. Rather than simply making notes of what Hardin says, ask “Why?” and “What is his evidence?” and ultimately “So what?” (i.e., why is what he saying important?). After your first discussion section, it’s a good idea to read the essay again to be sure you understand all of the key points and to make notes in preparation for this assignment.

**Topic**

Write a 2500-word (minimum), double-spaced essay in which you use key ideas from Hardin’s essay to discuss and suggest a solution (or solutions) to the one of the following current environmental problems.

1. Topsoil loss due to agricultural practices.
2. Water quality issues, especially from organic chemicals including fertilizers, pharmaceuticals, and personal health care products.
3. The eradication of the Guinea worm (*Dracunculus medinensis*) from Central America and Equatorial Africa. Consider any body of water capable of supporting the larval stage of the worm to be the commons. This has been one of the great accomplishments of modern medicine, led in large part by the Carter Center.
4. The excessive use of nitrogen based fertilizers (and some commercial products), especially in agricultural areas. You should examine the use of nitrogen-containing products within specific sectors of society, and trace their contamination and effects in groundwater, surface waters, and the oceans.
5. Deforestation in forests throughout the world, especially in tropical rain forests. The depletion of forest cover, exceeding 90 percent in some critical areas, presents both small and large-scale problems in water management, atmospheric pollution, loss of biodiversity, and soil nutrient depletion. You should evaluate the scope of the problem, and the impact of the individual farmer or rancher in Third World countries in particular.
6. The excessive use of antibiotics which has resulted in strains of totally antibiotic-resistant bacteria. Consider the use of antibiotics to *treat* active infections in humans and animals. Any use other than this (as, for example, the use of antibiotics as a prophylactic in farm animals) could be considered to be a form of excess use analogous to the +1 cow example in Hardin’s paper.

**Content and Structure**

Your paper should begin with a problem statement that describes the nature and scope of the environmental problem you’ve chosen. Your problem statement should not try to summarize Hardin’s article, but you should briefly discuss how Hardin presents us with a variety of ideas that can be helpful in thinking about the particular topic you’ve chosen. Early in your paper, but after your introduction/problem statement, you should also present a brief summary of Hardin’s article, in which you explain his thesis: what principle or principles does Hardin use to explain the Tragedy as he defines it?

In essence, what is the “Tragedy of the Commons” and what does Hardin argue we need to do in order to solve it? Either in this summary, or as your paper progresses, you need to be sure to discuss all the key concepts from Hardin in order to explain how they apply to your topic. For example, you need to write a brief and clear definition of the “commons” as Hardin uses it and then what the commons is for your selected topic. Similarly, you need to explain what Hardin identifies as the individual interests, the collective interest, the resulting conflict, and the possible route to a solution for the problem of overpopulation; then you need to explain what the individual interests, the collective interest, the resulting conflict, and the possible route to a solution for your topic.

Make it very clear what the commons is in your topic. Explore whether or not technical solutions are (or could be) currently applied to your topic to mitigate the problem; if they can, what are their limitations? In other words, explain why no technical solution on its own can fully solve the problem. What is/are the “non-technical” solution(s), then, that need to be employed? Be as specific and detailed as possible about these non-technical solutions: what exactly would you suggest needs to be done and at what level (local, regional, national, global)? How would your solution(s) be enforced?

You must base your analysis of your selected topic on at least five references from the technical literature and/or substantial journalistic sources (see below).

Remember: Your goal is to use Hardin as a frame of reference for proposing a solution to the problem posed by your topic. You could choose to disagree with Hardin’s argument that only non-technical solutions can ultimately resolve problems related to a particular commons, but you will need a strong counter-argument.

**Additional Tips**

1. Give your essay a title of your own! “The Tragedy of the Commons” is the name of Garrett Hardin’s essay, not yours! Your title should give your readers a clear idea of your topic and your argument.
2. Define your terms! Your paper absolutely must:
   * Explicitly define the commons
   * Explicitly define the individual interests
   * Explicitly define the collective interest
3. You should be sure to explain “mutual coercion” as Hardin uses it, and you must define it in the context of your topic.
4. Be sure to explain how the individual and collective interests are at odds with each other, resulting in tragedy. Juxtaposing the two interests is not enough. There is still a missing link. (Hint: consider a community composed of rational, self-interested men.)
5. Explain why an appeal to conscience will prove ineffective.
6. Where possible, be quantitative – you’re engineers.

**4.4 Reference Material**

If you have problems writing, you might want to consider a writing handbook, such as one of the following:

* *An Engineer’s Guide to Technical Communication* – Sherly A. Sorby and William M. Bulleit. Prentice Hall, 2005.

1. *Engineers' Guide to Technical Writing* – Kenneth G. Budinski, ASM International 2001.
2. *The Essence of Technical Communication for Engineers: Writing, Presentation, and Meeting Skills* – Herbert L. Hirsch. IEEE, 2000.

* *A Guide to Writing as an Engineer* – David F.Beer & David. McMurrey, Wiley 2009 (3rd Ed.)
* *Making Sense in Engineering and the Technical Science: A Student’s Guide to Research and Writing* – MargotNorthey & Judi Jewinski. Oxford University Press, 2009 (3rd Ed.).
* *Pocket Book of Technical Writing for Engineers and Scientists* – Finkelstein, McGraw-Hill, 2007 (3rd Ed).

Also, more general writing texts and reference works might be useful, including:

* Your English 3 Textbook
* *The Elements of Style −* William Strunk, Jr., and E. B. White. Longman, 1999 (4th Ed). [Everyone should own Strunk and White…..]

If you need a dictionary, a good online dictionary is available at <http://dictionary.cambridge.org>

Finally, if you have quick questions on style, grammar, or punctuation you might fine the University of Minnesota Center for Writing’s Quicktips web page helpful:

http://writing.umn.edu/sws/quicktips/quicktips.htm

(Ignore the “Documentation” section since we use different forms of citation and bibliographic form than they do, but the rest of their pages are can be very helpful).

**5.0 Team Research Project**

**Undergraduate Writing Center**

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Peer Learning Facilitators (PLFs) are undergraduates who understand the challenges of writing at

UCLA. They are friendly, experienced, and objective readers and attentive listeners trained to

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**What we do**

**We provide support for**

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• integrating sources • citing sources

• learning grammar • playing with style

• learning how to edit

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***See* http://wp.ucla.edu/wc/hours-location/ *for locations and hours***

**Scheduled appointments**

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▪ Submit your paper online, using Google Docs

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Undergraduate Writing Center

**What should I bring?**

• A draft if you have one

• Preliminary notes or writing is you don’t have a draft

• A copy of the assignment

• Instructor or peer comments on your paper

• Copies of readings or research related to the assignment

**Do I need an appointment?**

Yes, appointments are recommended whether you want a face-to-face session or an online session. You can book them one week in advance

**What if I can’t get an appointment?**

We have a waitlist. To get on it, come to the Writing Center OR send an email to wcenter@ucla.edu or call 310-206-1320. We will contact you if we have an appointment.

**How do online appointments work?**

They are similar to face-to-face sessions. You sign up for a 50-minute appointment. After you send us your paper via email, we upload it to Google Docs and contact you for a Google Voice Chat.

**What if I have a quick question about formatting, citations, or punctuation?**

We are happy to help with all of your writing questions. Email us at wcenter@ucla.edu, call us at 310-206-1320, or drop by A61 Humanities during our business hours.

**How often can I come in?**

You can make two appointments per week, but you have to finish the first one before you can make a second one. You cannot make back-to-back appointments.

**Can I drop off my paper off and pick it up later?**

No. That’s because our goal is to help you become a more confident writer by providing comments on your writing and useful strategies for approaching this and future writing assignments.

**Locations and Hours (hours subject to change)**

**See Writing Center Website**

http://wp.ucla.edu/wc/hours-location/

5.1 Teamwork in Engineering: Some Thoughts

When the subject of teamwork in engineering is introduced, experienced engineers will offer the opinion that engineering is a team sport. This metaphor is apt. Engineering is done by groups of people. Each individual brings his or her particular knowledge and skills base. The team synthesizes this knowledge, skills and talent base and plays a game in which it wins or loses. Frequently, the game is competitive - it's your team against the competition. Such is the environment during competitions to acquire work, e.g. during proposals or competitive phases of programs. Or the competition can be among alternative technologies in the marketplace. Or the game is absolute - winning means simultaneous achievement of technical (design, production, delivery, operation, service, etc), financial and schedule goals - losing is failing in any area.

The reasons that engineering involves teams are obvious. Most engineering endeavors involve many different disciplines of engineering, and many areas of expertise outside of engineering. The subjects involved are beyond the grasp of any single individual. Obviously it takes lots of people with different knowledge and skills. And it takes lots of people to accomplish the large number of tasks. So it comes as no surprise that they have to get together in some way. But the requirements for and payoff for high quality teamwork go well beyond this surface view. Good teamwork produces ideas and results that no single individual can get to; good teamwork provides a synergy in which the team is more than a sum of its parts. And it's that synergy that is required to win the game. The quality and characteristics of how people work with one another is probably the single most important factor in the success or failure of an engineering undertaking.

The engineering processes used to address complex engineering undertakings are the subjects of engineering project management. Their essence is to understand completely what is required of the project, to delineate each and every individual task that needs to be done, and to make sure every task is assigned and accomplished in a logical sequence and timely manner. The tasks are defined such that they all come together to arrive at a successful conclusion of what is frequently a quite complex product or activity. This is all well and good in theory. The problems of the real world intrude in the form of conflicting requirements, uncertainties in how to approach the problem(s) at hand (particularly if you are doing something for the first time), inadequate data, conflicting data, inadequate budgets, inadequate time, conflicts among priorities for facilities, personnel, etc. The situation is further complicated by conflicts among priorities of a personal nature among the people involved. Given the complexity and highly indeterminate nature of the real world problems, it comes as no surprise that the essential ingredient for success is a collective human intelligence, repeatedly and repetitively applied.

Since effective teamwork is an essential element in the accomplishment of engineering endeavors, it follows that people who are adept at forming, leading or facilitating teams are treasured. Team skills determine career success or failure for most engineers, far more than individual technical knowledge or expertise.

The skills that lead to effective teamwork can be learned. Again the metaphor of engineering as a sport is helpful. Teamwork in progress is essentially experiential just as sports are. However, there are fundamentals that can be learned and practiced, some individually and some with partners and some in context with team activity - just as in most sports. The learning process involves a constant iteration between the fundamental ideals and the practices of the team. Awareness of the fundamentals, observations regarding their effectiveness in the team activity, and the experiential feedback can lead to ever more effective teams. Eventually the team environment becomes a cultural environment and the whole thing just feels natural.

In teamwork the fundamentals separate into two broad areas - interpersonal and rational. The interpersonal skills involve how people relate to each other; how well they communicate (both transmit and receive), whether they interact to promote communication (rather than stifle it), whether they can differ constructively. The rational skills deal with the processes followed by the team in dealing with the problem at hand; delineating the issues and the sequence in which to address them, analyzing the situation, setting objectives, developing alternative courses of action, identifying obstacles and adverse consequences, and processes of decision making. These subjects will be discussed during the sessions on teamwork and in context with the class team projects.

Effective teams involve intense individual effort, group cooperation, team support, and leadership. On an effective team each individual knows his or her role, assignment, goal and responsibility. However, effort does not stop at the boundary of an individuals’ assignment. Any effort on any task that will make the team succeed is what the team members do; this is the hallmark of teamwork. Good team members do not balk at what appears to be an uneven distribution of workload; after all, we do not have equal capabilities on all varieties of tasks. If an individual succeeds at his or her task, even brilliantly, but some other member fails, then the whole team fails. When the motivation is team success, no one celebrates an individual victory separate from team victory.

Effective leadership facilitates tapping into the knowledge and skills of all the team members, motivates the team to work together, and achieves a synergy that exceeds the capabilities of individual members working alone. Leadership may pass from person to person depending on the task at hand. Frequently, one member of a team may be adept at providing leadership. However leadership on effective teams is not synonymous with domination. It is not unusual on a small team that one person tries to take charge and dominate the team without a spirit of group participation and shared commitment. This does not lead to effective teamwork. An effective group will challenge such an attempt.

**5.2 Overview**

We require teams typically made up of 4 or 5 students to research and analyze a contemporary problem containing both technological and societal/ethical factors, and to write a comprehensive Final Team Research Report supported by references from the technical literature and other sources documenting their research results and their recommendations for problem solution. The body of the Report is typically 35 to 45 pages long, representing about 7-9 pages per student. We present 4 to 6 potential research topics early in the course. Students in a discussion section are free to organize themselves into groups and each group can choose the topic it will work on; or in some cases the instructors will help form groups based on student preferences.

**5.3 Purpose**

The primary objectives of this project are to provide the students with: (1) an ability to function on multi-disciplinary teams, (2) a better understanding of the impact of engineering solutions in a global and societal context; (3) a deeper knowledge of contemporary issues; skills in communicating through written reports and oral presentations. Multi-disciplinary teamwork is a major factor: Teams are typically drawn from several engineering disciplines. The team members work together to choose a problem, analyze it, organize all the components of the report, gather the appropriate material and references and write and produce the finished report. We expect the students to present a well-written and integrated product *that reflects actual teamwork.* This requires that the teams meet on a regular basis during the quarter, exchange notes and drafts, provide periodic team progress reports -- ***including a final oral presentation by all team members (see pages 49-50)*** -- and subject their individually-written sections to an overall integration and editorial process prior to submission of the final Report.

**5.4 The Work Breakdown Structure as a Model for the Team Project**

The Work Breakdown Structure (WBS) is a fundamental tool in engineering management. In some ways similar to an Organization Chart, the WBS seeks to break down an engineering project by fundamental engineering disciplines and areas of expertise. In developing an iPod, for example, the WBS would have the project broken down into categories like Programming, Circuits, Display, Memory (either a hard or flash drive), Battery, and so forth.

In a similar manner, your Engineering 183EW team effort can be broken down into subcategories that individual members of the team can easily tackle. For example, the following is a WBS for a team project that was submitted several years ago in Engineering 183EW.

**The Future of Electrical Vehicles**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **↓**  **Problem Statement and Background**  **↘** | **↓**  **Pollution**  **↘** | **↓**  **Power Grid**  **Capacity**  ↓ | **↓**  **Charging**  **Station**  **Availability**  ↓ | **↓**  **Battery Use**  **And**  **Production**  **↙** | **↓**  **Motors**  **↙** |

**↓**

**Introduction**

**Ethical Considerations**

**Recommended Solutions**

Technical Recommendations

Ethical Recommendations

**Conclusion**

**Executive Summary**

Figure 1. A Work Breakdown Structure for an Engineering 183EW Team Project

In examining the Work Breakdown Structure, it is clear (and we will continually emphasize) that the individual technical “chapters” (written by individual team members) must be completed before any meaningful discussion can take place within the team regarding ethical considerations or determining recommended solutions. For that reason, we ask that each team member have a “Zeroth” draft of his or her technical section completed by the sixth week.

* 1. **Team Topics – Summer Session, 2017**

These are beginning points for your team reports. ***We expect and encourage you to expand these simple prompts as your research progresses.***

1. Driverless Cars: Their social and economic impact.  Focus on safety, liability, economics, and loss of jobs.
2. High Speed Trains: What's California's Problem?  Can it be solved?  How?
3. DNA Engineering.  What's the technology behind the recent advances such as CRISPR? What are the potential benefits and risks?  Should the technology have ethical limits? If so, what are they?
4. Space Exploration: Are the Benefits Worth the Costs?
5. Geothermal Energy: Are we There Yet?
6. Climate Change.  What is the current thinking on drivers, projections, appropriate responses and societal effects.  With the now US abdicating its leadership role, what is an alternative approach to a worldwide ethical position and collaboration?
7. Protecting the Ballot Box. For nearly thirty years we (as a society) have been warned about the fragility of electronic voting. The resent revelations about hacking during the 2017 campaign have only heightened the necessity for society to find a way to protect the ballot box. What is the history of hacking and other intrusions on the voting process, and how has inept voting machine design helped those with

**5.6 Guidance and Grading**

* **Report Outline.** A recommended form of the *Report Outline* is provided on page 28. The Report Outline ensures that each Report section is separately covered, and is numbered and identified by its own heading. We *strongly advise* this Report organization be followed unless there is a compelling reason to change it.
* **Executive Summary.** We require in all cases that an Executive Summary, as defined below, is included as the first section. This is a very important requirement, and should be given the full attention of the team!
* **Report Style.** A *Style Guide* for preparation of the Report is provided in the following section. Again, we strongly advise that the groups follow the recommendations of the Guide in preparing their Report unless there is something about their particular Report that requires a change. In that case, the need for the change and the change itself should be noted in the Report.

**5.7** **Standard Team Research Report Outline**

**0. Executive Summary**

Summarizes the ***entire report***, including statement of the problem and its importance, the major technological and ethical issues involved, *and the solution or approach to a solution being recommended by the group*. The idea of an Executive Summary is that a busy executive can read just this section and still get the essence of the whole project. A good Executive Summary is typically 3-4 pages long (depending on the size of the group).

1. **Introduction**

Describes the methodology followed in preparing the Report and the individual contributions of the Team Members

1. **Statement of the Problem/Background**

Provides a more detailed description of the specific problem being analyzed. Describes previous work and/or analyses in the problem area.

1. **Technological Issues**

Describes the technology or methodology associated with the problem area, including, as appropriate, the goals of the technology, the major options for achieving these goals and the costs or technical problems associated with these options.

1. **Ethical and Societal Issues**

Describes how the technology raises issues of ethical and/or societal concern, including, as appropriate which groups are affected in which ways, conflicts among groups, etc. ***This is the most important section of the paper, and its content and length should show appropriate care in its preparation.*** In virtually all cases all ethical and societal issues should be presented in this chapter, rather than in the individual sections of the chapter on Technological Issues.

1. **Recommended Solution**

Presents one or more recommended solutions *by the project team* that take into account technological as well as ethical/societal factors, including the rationale and methodology used to achieve the solutions.

1. **Conclusion**

Summarizes what the Report has achieved in terms of understanding the problem and pointing the way to a solution. Estimates what is likely to actually happen in the area being researched.

**7. References**

Lists of all Report references in accord with the Style Guide.

**5.8**  **Organization**

Occasionally, some topics may seem to be better suited for organizing along topical lines (e.g., in a paper on alternative energy, one “chapter” might be on wind power, another on solar power, another on geothermal power, etc.). If your group follows this style, each technical issue may be treated as a separate “chapter.” **However, the ethical discussion of the team report must remain as a separate chapter because of the overlapping nature of the ethical discussion. In the ethical discussion, all team members must participate, although one team member may take the lead in preparing that chapter.**

**5.9 Grading Criteria.** The main criteria we use to grade the reports are:

* + A sufficient number of references from library, Internet, and other sources (usually from 20 to 30), and their effective use in the appropriate report sections;
  + A logical and comprehensive approach to organization, description *and solution of the selected problem,* including an outline and numbering system for the sections and sub-sections that helps the reader understand the flow of the report
  + A coherent and easy-to-read writing style with minimal spelling and grammatical errors;
  + An appropriate number of figures and illustrations that help the reader understand the points being made
  + A professional and attractive presentation format, including page layout, cover, etc.

**5.10 RAM Chart**

As part of the organization of your group, your team should create a RAM (Responsibility Assignment Matrix) Chart, as illustrated on the next page. This chart, or an updated version, can be used in the Introduction of your team paper to show which team member was responsible for what part of the report.

**Typical RAM Chart for Engineering 183 Team Project**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Name 1** | **Name 2** | **Name 3** | **Name 4** | **Name 5** |
| Front Matter | **P** | **R** |  |  |  |
| Introduction | **D, I** | **D, I** | **D, I, P** | **D, I, R** | **D, I** |
| Topic 1 | **P** | **R** |  |  |  |
| Topic 2 |  | **P** | **R** |  |  |
| Topic 3 |  |  | **P** | **R** |  |
| Topic 4 |  |  |  | **P** | **R** |
| Topic 5 | **R** |  |  |  | **P** |
| Ethical Discussion | **D, I** | **D, I** | **D, I, R** | **D, I** | **D, I, P** |
| Recommendations |  |  |  |  |  |
| Conclusion | **D, I, P** | **D, I, R** | **D, I** | **D, I** | **D, I** |
| References Cited |  |  | **P** | **R** |  |
| Final Proofreading |  | **P** |  |  |  |

P = Primary Responsibility for Writing

R = Review for content, form, and grammar

D = Discuss

I = Input

***Please note that all members of the team are responsible for participating in the development of the Introduction and the Conclusions.*6.0 Style Manual**

**6.1 Introduction**

The primary purpose of this Style Guide is to describe the mechanics of preparing the Team Project Report in a professional manner. But style refers also to the format, choice of words, grammar, spelling, and punctuation,and the way the words are put together in phrases, clauses and sentences. It is important that these elements should be consistent with reports prepared by engineers in industry and in government. To insure this, the writing styles of the individual contributors should be subordinated to the unity of the report. This is generally done by (1) discussing beforehand the Report style among the Team members and (2) post-writing review by a designated editor. Editing and proof reading are paramount requirements, and should be done carefully before the Report is submitted. Appearance is also a major factor, and a suitable choice of binding as well as attractive page layout, including illustrations, certainly influence how a Report is graded.

**6.2 Format and Length of Team Report**

Use standard white paper, 8-1/2 by 11 inches, with 1-inch margins on the left, right, top and bottom. Use 11 point Times Roman or similar serif font and 1.5 line spacing. Number the Title Page, Table of Contents and other introductory material, beginning with ‘i” at the bottom center of the first page. Number all pages of the text, including References, beginning with number 1 at the bottom center of the first page of text. Major divisions of the report should be clearly identified by major headings and main topics under the major headings should be identified by sub-headings. It is strongly suggested that headings and sub-headings be numbered.

Each Team member should write no less than seven pages of the Report, with graphics (figures, tables, illustrations) not to exceed 20% of this portion. Additional graphics can be included in appendices or attachments. Graphics are highly recommended, but they should: (1) be appropriate and expand the meaning of the text; and (2) be properly identified if they come from an outside source or reference. The list of references, which reflects the work of the entire team, is not included in the page count for the individual authors.

A formal checklist for final report turn-in is on page 63 of this Course Manual. A copy of this checklist is to be included with the package containing the final report.

**Title Page**

The first page of the Report should show the title (in capital letters), the authors, the date, and the course name and number.

# Table of Contents

The heading of the page is CONTENTS. It should list all major sections and sub-sections of the paper. Give only the beginning page number of each section, and align the page numbers on the right.

# List of Illustrations and Tables

This is optional, but if it is included, it should list the illustrations and tables and give the page number of each, with the page numbers aligned on the right.

# Glossary

If the paper contains many abbreviations or acronyms, include an alphabetical list at either the beginning or end of the body of the report.

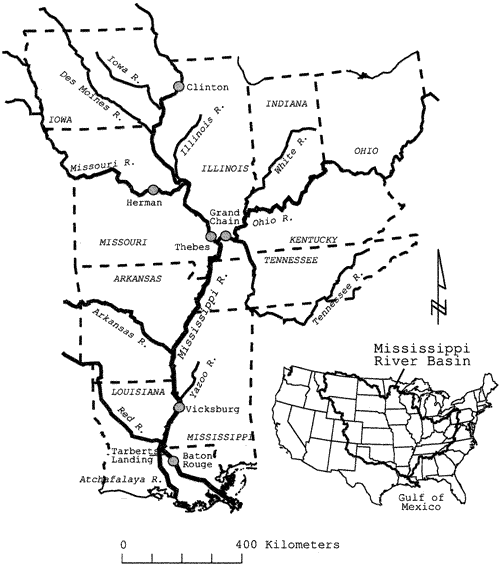
**Credits**

Either at the end of the Introduction section or in a separate section, identify which team member was responsible for each task (editor, bibliographer, etc.) and the author(s) of each major section of the report.

**References**

The References should include a broad range of resources (books, journals, newspapers, web sites) and demonstrate a depth sufficient to include the key sources for the area. Do not pad the bibliography; include only the references actually used by the teams. The list of references at the end of the paper should be one, single, unified, alphabetical list of the sources used by the group; do not break down the list by topic, type of reference or group member. Put “Anonymous” for the author if none is given. However, if the website is from a business or corporation, then you should use that as the author. While some organizations, such as professional societies, government agencies and companies have specific guideline for authors, we recommend the following typical formats for the various reference types. The specific form of references is discussed in Section 7.0, beginning on page 35.

**6.3 Figures**

Figures should be inserted at an appropriate location within the text and must have a caption and reference in the following form – with your own text wrapping around the figure.

Figures should help tell the story, not be a gratuitous cartoon meant to provide filler (as tempting as it might be in a paper on nuclear power, a cartoon with Mr. Burns in it is inappropriate, except perhaps as cover art).

For examples of how to use figures and tables, look at any textbook you own, and any technical journal that you have used (or are using for either your ethical case study paper or your Hardin paper.)

The following are examples of how figures and captions should be inserted in the text of your report:

Figure 2. The Mississippi River Basin

and sampling sites. (Clark, Goolsby,

and Battaglin, 1999).

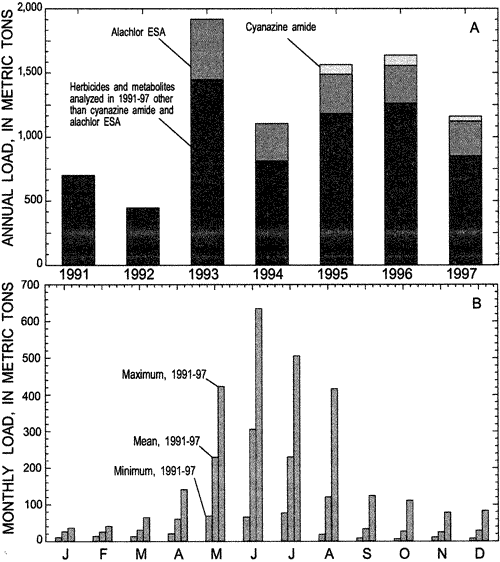


Figure 3. Annual and monthly loads of

herbicides discharged from the Mississippi

River Basin to the Gulf of Mexico, 1991−

1997. (Monthly loads represent the total

load of herbicides and metabolites listed

in Table 1. Loads for January, February,

and March are for 1992−1997; all other

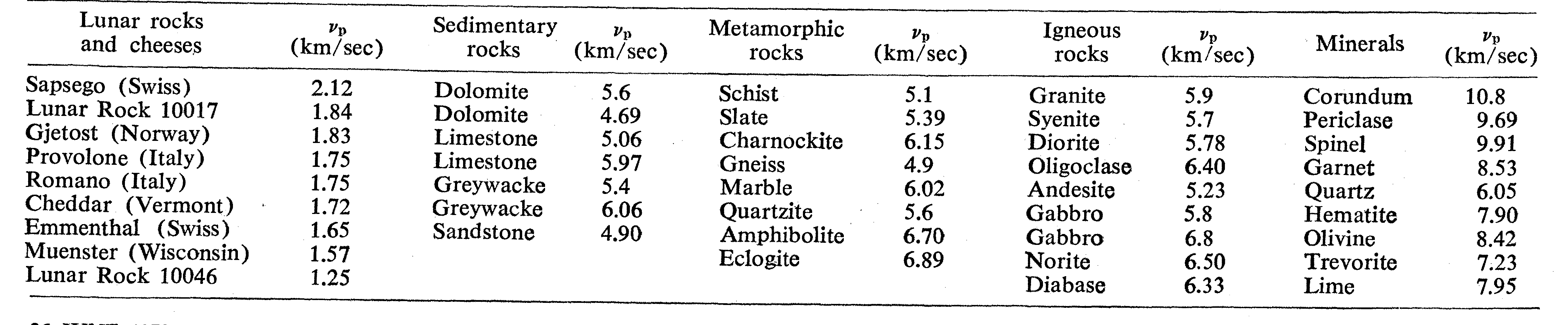
months are for 1991−1997). (Clark,

Goolsby, and Battaglin, 1999).

**6.4 Tables:**

Tables should be treated in the same manner, placing the caption *above* the table:

Table 1. Comparison of compressional velocities of lunar rocks and various earth materials. (Schreiber and Anderson, 1970, p. 1579).



**6.5 Report Submission**

Submit two copies of the Team Research Report. One copy should be bound using either a “coil” or a “comb” binding (available at commercial photocopy shops, several of which are in Westwood Village); the second copy should be unbound, secured only by a paper clip. Based on past experience, we highly recommend Westwood Copies, next to Coffee Bean on Gayley (across the street from Whole Foods).

***If you use color in the report, only the bound report need have color printing. But please, go easy on the color: it’s expensive for you, and often doesn’t add much value to the report. The vast majority of academic and technical journals still print primarily in black and white, and they do just fine. There are times of course, where you must use color. For example, if you use a chart from an outside source that uses color lines to differentiate different variables, you have to include the color to allow differentiation of the lines.***

***If you must use color, try to restrict it to just a few pages. If necessary, contact Browne for suggestions on how to keep costs down. The SEASnet lab has a color printer at very attractive prices.***

***In addition, do not let the copy center sell you on fancy glossy paper. All we request is plain 20-pound bond.***

Put both copies of the report in a manila envelope (**which we will provide**). Reports should be submitted to 6417 Boelter Hall no later than 5 pm on Friday, August 18, 2017. In addition, electronic copies of both the report and the PowerPoint slides from the oral presentation should be posted on CCLE.

In addition, please use the checklist on page 63 to make sure that all aspects of the final report have been completed and included in the report.

**7.0 Citations**

**7.1 Some Preliminaries**

In the sciences and engineers, professionals use forms of citation that you have probably not encountered previously.

We *do not* use the format of the Modern Language Association (MLA) which you may have encountered in English 3. MLA Format is primarily an English Department and humanities thing, and is not used in the sciences and engineering.

We generally *do not* use footnotes in engineering and scientific papers, although some journals may use them at the beginning of a published paper to identify the institutional affiliation and address of the author(s). Footnotes are generally used in the humanities, social sciences, and law.

For ease of paper preparation, we *do not* use bracketed numbers (e.g. [12]) as in-text references in Engineering 183EW, although they are widely used in scientific and engineering publications such as *Science* and the *IEEE Transactions*. It has been our experience that beginning teams have trouble keeping track of which number belongs to whom. The identical reference may be reference [2] for one student on a team, reference [16] for another student, and reference [7] for a third student. When the group has to merge the members’ drafts at the end the quarter, someone has to straighten out the numbering system, which can take a good deal of time. It seems better to follow a “name-date” system, which we use in Engineering 183EW: the reference “(Jones, 2008)” is the same for everyone.

**7.2 Citation Style within Text**

All references should be cited within the body of the report in the form (Jones, 2007), Jones (2007), (Jones, 2007, p. 154) or Jones (2007, p. 154.) Do not include web URLs within a citation in the body of the text; save it for the bibliography at the end of the paper. Do ***not*** use footnotes. Do ***not*** use numbered references (e.g. [12]).

**7.3 Bibliographic Form**

The general bibliographic form in Engineering 183EW contains the following elements:

1. Author (name inverted: Hubbert, M. K.). If there is more than one author, list them all if there are between one and three (Hubbert, M. K., Rubey, W. W., and Pierce, W. G.). If there are more than three authors (either in text or the references cited, use “et al.”: Hubbert, Rubey, Pierce, and Love becomes simply Hubbert et al.).
2. Date of publication
3. Title of book or journal article
4. Publication data (for books, the place of publication and the publisher; for journal articles, the name of the journal, the volume number, the issue number (if available), and the page spread.

**7.4 Reference Format Samples**

[Note that this format requires no italics and no journal abbreviations;

Please use hanging indents for all bibliographical references.]

|  |  |  |
| --- | --- | --- |
| Document Type | | Reference Format |
| Book | | Burks, A. R., 2003, Who invented the computer?: Amherst, N. Y., Prometheus Books, 463 p.  *[Author’s last name, initials, Year of Publication, Title: Place of Publication (including state*  *if not obvious), Publisher, Number of Pages.]* |
| Journals | | Aspray, W. F., 1982, History of the stored-program concept; Annals of the History of Computing, v. 2, pp. 358-61.  *[Author’s last name, initials, Year of Publication, Title of Article: Full name of Journal (no abbreviations), v. no, (issue no. if available), Page spread.]* |
| Newspapers | | Mollenhoff, C. R., January 17, 1974, Court: Computer Iowan’s idea: Des Moines [Iowa] Sunday Register.  *[Author’s last name, initials (if available) or Newspaper Name, Full date of article, Title of Article: Name of Newspaper, Page spread if available. If no author is listed, than the paper itself is the author. An editorial is authored by the Newspaper, but should have the notation “*[Editorial]*” after the title of the article.]* |
| Government Reports  (generally a formal report with wide distribution, as opposed to a Government Document or Technical Report, both listed below} | | National Transportation Safety Board, 2001, Aircraft accident report: Uncontrolled descent and collision with terrain, United Airlines Flight 585, Boeing 737-200, N999UA, 4 miles south of Colorado Springs Municipal Airport, Colorado Springs, Colorado, March 3, 1991: Washington, D. C., National Transportation Safety Board Report NTSB/AAR-01/01, 196 p. [PB2001-910401, http://www.ntsb.gov/publictn/2001/AAR0101.pdf].  Columbia Accident Investigation Board, 2003, Report: Washington, D.C.: U. S. Government Printing Office, 5 vols. [http://caib.nasa.gov/news/report].  *[Government Agency as Author, Year of Publication, Full title: Place of publication (including state, if not obvious), Government Agency, Number of Pages [Microfilm/microfiche availability number and/or web URL, if appropriate].]* |
| Popular Magazines | Bedard, P., June, 1984, The midnight ride of John Vincent Atanasoff: Car and Driver Magazine, p. 192.  Langewiesche, W., 2003, Columbia’s last flight: The inside story of the investigation – and the catastrophe it laid bare: The Atlantic Monthly, v. 292, no. 4, pp. 58-87.  *[Author’s last name, initials, month and year of publication, Title: Full title of publication (no abbreviations), volume number, issue number (if available), page spread]* | |
| Government Documents  (a government issued document with limited circulation; letters to and from government officials would generally be considered here). | Apostolakis, G. E., chairman, 2001, Letter report to William D. Travers re: Risk-based performance indicators: Phase 1 Report: Washington, D. C., Advisory Committee on Reactor Safeguards, U. S. Nuclear Regulatory Commission, 5 p. [http://www.nrc.gov/reading-rm/doc-collections/acrs/letters/001/ 831946.pdf].  South Coast Air Quality Management District, 2005, Guidance document for addressing air quality issues in general plans and local planning: A reference for local governments within the South Coast Air Quality Management District: Diamond Bar, Calif.: South Coast Air Quality Management District, 245 p.  *[Author’s last name, initials, and title if appropriate [or corporate name], year of publication, Full Title: City of publication (and state, if not obvious], Government agency issuing the document, number of pages.]* | |
| Technical Report  (a formal report with limited distribution; look for a alphanumeric designator) | Kaiper, G. V., 2003, California energy flow – 1999: Livermore, Calif,: Lawrence Livermore National Laboratory Report UCRL-ID-18991-99, 34 p. [https://e-reports-ext.llnl.gov/pdf/243358.pdf].  *[Author’s last name, initials, Year of publication, Full title: City of publication (and state, if not obvious): Publishing organization, Report Number, number of pages, [Microfilm/microfiche availability number and/or web URL, if appropriate]].* | |

|  |  |  |
| --- | --- | --- |
| Legal Materials | Legal materials require special formatting. An in-text format should follow the format of (Name of case [abbreviated, if necessary], date). Hence,  (Brown v. Board of Education, 1954). The bibliographic entry should read:  Brown v. Board of Education of Topeka, et al., 1954: 347 United States Reports 483.  *[Full name of case, date: Volume, Title of legal reporter (e.g. United States Reports), beginning page number.]* | |
| Personal Communication (from an interview, phone conversation, or discussion at a technical meeting. | [no reference in bibliography; however in the text of the paper, acknowledgement should be given in the form of  “...W. T.. Jones (personal communication, 2008) noted that….”  or  “it was recently noted that smog is not increasing in Los Angeles (W. T. Doerr, personal communication, 2008)...” | |
| Other materials | | [contact Mr. Browne] *or* use the generic form of a citation:  *[Name of author (individual authors or an organization), date, title of publication: Publication data.]* |

**7.5 Excessively Long Reference URLs**

Do ***not*** include an excessively long reference URL in the bibliography: Simply note that you accessed it through Lexis-Nexis or whatever search engine you used. In many cases, long URLs are not permanent, and will disappear the moment you log off. The following is an example of a URL format that should be avoided:

Midland Daily News, Accent Features, [http://infoweb.newsbank.com/iw-search/we/InfoWeb?p\_action=doc&p\_docid=10C388B0EC376988&p\_docnum=1&p\_queryname=8&p\_product=AWNB&p\_theme=aggregated4&p\_nbid=E58B4ATGMTE0MjYzMzk1NC42NDA5NTk6MToxMzoxMjguOTcuMjQ0LjM3]. Accessed on March 16, 2006.

Note that is has no author (although there is a possibility that the article did not have a named author, in which case using the name of the newspaper is appropriate); it has no date given for the actual article, and it gives a impossibly long URL for the article’s site. In reality, no one is going to type in that level of gobbledygook. If the author, title, name of newspaper, and date are present, the article could easily be retrieved from Newsbank.

**7.6 Reference List**

A single, alphabetical Reference List should be prepared and placed at the end of the text of the report. The form for each entry is shown in the table on pages 36-38 . You should not break down the bibliography by type of reference or by individual group members: it should be a single list that represents a compilation of everyone’s reference material.

Putting each of the above reference citations in alphabetical order, we get:

Apostolakis, G. E., chairman, 2001, Letter report to William D. Travers re: Risk-based performance indicators: Phase 1 Report: Washington, D. C., Advisory Committee on Reactor Safegu36-38ards, U. S. Nuclear Regulatory Commission, 5 p. [http://www.nrc.gov/reading-rm/doc-collections/acrs/letters/001/ 831946.pdf].

Aspray, W. F., 1982, History of the stored-program concept; Annals of the History of Computing, v. 2, pp. 358-61.

Bedard, P., June, 1984, The midnight ride of John Vincent Atanasoff: Car and Driver Magazine, p. 192.

Brown v. Board of Education of Topeka, et al., 1954: 347 United States Reports 483.

Burks, A. R., 2003, Who invented the computer?: Amherst, N. Y., Prometheus Books, 463 p.

Kaiper, G. V., 2003, California energy flow – 1999: Livermore, Calif,: Lawrence Livermore National Laboratory Report UCRL-ID-18991-99, 34 p. [https://e-reports-ext.llnl.gov/pdf/243358.pdf].

Mollenhoff, C. R., January 17, 1974, Court: Computer Iowan’s idea: Des Moines [Iowa] Sunday Register.

National Transportation Safety Board, 2001, Aircraft accident report: Uncontrolled descent and collision with terrain, United Airlines Flight 585, Boeing 737-200, N999UA, 4 miles south of Colorado Springs Municipal Airport, Colorado Springs, Colorado, March 3, 1991: Washington, D. C., National Transportation Safety Board Report NTSB/AAR-01/01, 196 p. [PB2001-910401, http://www.ntsb.gov/publictn/2001/AAR0101.pdf].

South Coast Air Quality Management District, 2005, Guidance document for addressing air quality issues in general plans and local planning: A reference for local governments within the South Coast Air Quality Management District: Diamond Bar, Calif.: South Coast Air Quality Management District, 245 p.

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2006, Your home’s energy use. [http://www1.eere.energy.gov/consumer/tips/home\_energy.html; Accessed January 2, 2008].

**7.7** **Bad References**

The following are references from some recent student papers that have problems. The original student citation is given in **bold**, comments in Small Caps and *italics*, and the proper form of the citation in Roman.

**American Society of Civil Engineers, 2007, The New Orleans Hurricane Protection System: What Went Wrong and Why, 84 pgs.**

**[http://web.archive.org/web/20080624204644/http://www.asce.org/files/pdf/ERReport.pdf]**

The citation has an incorrect URL: the correct address has “ERPreport” not “ERreport” after the last forward slash. In addition, the use of a secondary web archive is probably not wise since the report is still available on the web site of the American Society of Civil Engineers itself. Additionally, the citation does not give a place of publication. Also, it would be wise to simply cite to the paper copy of the report.

*Correct address:*

*http://web.archive.org/web/20080624204644/http://www.asce.org/files/pdf/ERPreport*

*.pdf*

*Correct citation:*

American Society of Civil Engineers, 2007, The New Orleans Hurricane Protection System: What Went Wrong and Why: Reston, Virginia, American Society of Civil Engineers, 84 p.

**NOVA Interview, 2004, The Man who New. [http://www.pbs.org/wgbh.nova/orleans/vanheerden.html]**

**UC Berkeley Independent Levee Investigation Team, 2006, Chapter Ten: Evaluation of Earthen Levees. [http://www.ce.berkeley.edu/projects/neworleans/report/Draft/CH\_10.pdf]**

This is actually two citations that seemed to have been inadvertently run together. The first citation, to the NOVA interview, should read “NOVA Interview, 2004, The Man who Knew: [http://www.pbs.org/wgbh.nova/orleans/vanheerden.html]

**[http://newsgroups.derkeiler.com/Archive/Soc/soc.culture.cuba/2005-09/msg00364.html] Drowning New Orleans, Scientific American**

This citation is to an .html text version of the article, which contains no illustrations and no bibliography. A better solution would be to go to the full .pdf text (with illustrations and bibliography) via Melvyl and then the database vendor (Ebscohost in this case) and then simply cite to the paper copy.

*Correct citation:*

Fischetti, Mark, 2001, Drowning New Orleans: Scientific American, v. 285, no. 4, pp. 76-85.

**[http://www.nola.com/hurricane/content/ssf?/washingaway/index.html] Washing Away, New Orleans Times-Picayune.**

There are several problems with this citation. First of all, it simply fails to follow any sensible bibliographic form. Secondly, the URL given has an error, which leads to a 404 message: the real URL has a period between “content” and “ssf?”, rather than the forward slash in the student’s citation. The citation as given has no authors listed, nor dates.

Correct URL: http://www.nola.com/hurricane/content.ssf?/washingaway/index.html

*Correct citation:*

McQuaid, John and Schleifstein, Mark, 2002, Washing Away [Five part report on the hurricane fragility of New Orleans, published June 23-27, 2002]: New Orleans Times Picayne

[The parenthetical note is appropriate in this case to call the reader’s attention to the fact that the articles in the Times-Picayune were published over a five-day period, and represent several hundred pages of standard text if printed out.]

**Davis, Michael, Spring 2007, Perils of Using Hurricane Katrina to Teach Engineering Ethics, IEEE Technology and Society Magazine**

**[http://ieeeexplore.ieee.org/stamp/stamp.jsp?arnumber=04408564]**

The citation as given above is only to the URL of the paper, and does not include any data on the paper copy of the paper, which is the norm in publication.

*Correct Citation:*

Davis, Michael, 2007, Perils of Using Hurricane Katrina to Teach Engineering Ethics: IEEE Technology and Society Magazine, vol. 26, no. 4, pp. 16-22.

**8.0** **Plagiarism**

**We will not tolerate plagiarism or**

**any related academic offense in Engineering 183EW!**

**The Issue of Plagiarism**

Plagiarism is a good example of the type of complex ethical issues you will study and learn to deal with in Engineering 183. On the one hand, we will encourage you to understand the work of others and to integrate it into your individual essays and team research report – appropriately and with proper referencing. On the other hand, we will not permit you to present other people’s work or writing as your own (either on purpose or by not knowing the ethics of referencing and/or the proper referencing procedures), to use recycled or multiply submitted material in any form, or to help other people do these things.

As both an Engineering student and a member of the University community you are expected to demonstrate integrity in all of your academic endeavors. This is particularly true as a member of a class devoted to learning professional ethical conduct. You are ultimately evaluated on your own merits, which include your ethical behavior, so be proud of your accomplishments, and help protect academic integrity at UCLA by learning to avoid the pitfalls of plagiarism and recycling or multiple submission.

**Prohibited Actions**

The *UCLA Student Conduct Code* provides the following definitions of plagiarism and related prohibited actions:

102.01c: Plagiarism

Plagiarism includes, but is not limited to, the use of another's words or ideas as if they were one's own, including, but not limited to, representing, either with the intent to deceive or by the omission of the true source, part of or an entire work produced by someone other than the student, obtained by purchase or otherwise, as the student's original work or representing the identifiable but altered ideas, data, or writing of another person as if those ideas, data, or writing were the student's original work.

102.01d: Multiple Submissions

Multiple submissions includes, but is not limited to, the resubmission by a student of any work which has been previously submitted for credit in identical or similar form in one course to fulfill the requirements of a second course, without the informed permission/consent of the instructor of the second course; or the submission by a student of any work submitted for credit in identical or similar form in one course to fulfill the requirements of a concurrent course, without the permission/consent of the instructors of both courses.

102.01e: Facilitating Academic Dishonesty

Facilitating academic dishonesty includes, but is not limited to, knowingly helping another student commit an act of academic misconduct (e.g., cheating, fabrication, plagiarism, multiple submissions).

The full text of the UCLA Student Conduct Code is available at http://www.deanofstudents.ucla.edu/studentconductcode.pdf

**Examples of Proper and Improper Usage**

As examples of how a quotation may and may not be used in an academic paper, we include in the following examples of 1) Proper quotation in text and in the bibliography; 2) Questionable quotations which could border on plagiarism, and 3) Out-and-out plagiarism.

**1. Proper Quotation**: This is what we’d like to see:

***The following quotation has: (1) quotation marks around the quotation, indicating that they are McPhee’s words, (2) a citation to McPhee’s work immediately after the quotation, and ( 3) a full bibliographic reference in the list of references at the back of the paper.***

“The Hayward Fault alone has contributed more than a hundred miles of offset. Running southeast from San Pablo Bay, north of San Francisco, to the latitude of Santa Cruz, it disappears near Gilroy, not far from the San Andreas Fault at San Juan Bautista. In many places, such as Berkeley, the Hayward Fault has Jurassic rock of the Franciscan mélange on one side of it and Cretaceous rock of the Great Valley sequence sort of dredged up on the other side….The Hayward Fault runs not only through Memorial Stadium but also through or very near the Alameda County hospital, the San Leandro hospital, and California State University, Hayward. The Hayward Fault also ran through the California School for the Deaf and Blind, but the State became nervous, moved the school to another site, and then filled up its old dorms with Berkeley undergraduates” (McPhee, 1998, p. 600-601).

→ McPhee, J., 1998, Annals of the Former World: New York:

Farrar, Straus and Giroux, 696 p.

**2) Questionable Quotation:** This is what you want to avoid.

***The following has one major defect: no quotation marks. Although McPhee is credited at the end of the paragraph and in the references, there is no indication that this is a direct quotation, and the reader is forced to actually go the reference to determine if the paragraph is McPhee’s or the writer’s paraphrase of McPhee’s work.***

The Hayward Fault alone has contributed more than a hundred miles of offset. Running southeast from San Pablo Bay, north of San Francisco, to the latitude of Santa Cruz, it disappears near Gilroy, not far from the San Andreas Fault at San Juan Bautista. In many places, such as Berkeley, the Hayward Fault has Jurassic rock of the Franciscan mélange on one side of it and Cretaceous rock of the Great Valley sequence sort of dredged up on the other side….The Hayward Fault runs not only through Memorial Stadium but also through or very near the Alameda County hospital, the San Leandro hospital, and California State University, Hayward. The Hayward Fault also ran through the California School for the Deaf and Blind, but the State became nervous, moved the school to another site, and then filled up its old dorms with Berkeley undergraduates (McPhee, 1998, p. 600-601).

→ McPhee, J., 1998, Annals of the former world: New York:

Farrar, Straus and Giroux, 696 p.

**3) Another Questionable Quotation:** This is another example of what you should avoid.

***The following excerpt is really problematical, in that there is no reference to McPhee at all in regard to the material presented. McPhee is noted in the bibliography, but there is no connection between the text and the bibliographic entry.***

The Hayward Fault alone has contributed more than a hundred miles of offset. Running southeast from San Pablo Bay, north of San Francisco, to the latitude of Santa Cruz, it disappears near Gilroy, not far from the San Andreas Fault at San Juan Bautista. In many places, such as Berkeley, the Hayward Fault has Jurassic rock of the Franciscan mélange on one side of it and Cretaceous rock of the Great Valley sequence sort of dredged up on the other side….The Hayward Fault runs not only through Memorial Stadium but also through or very near the Alameda County hospital, the San Leandro hospital, and California State University, Hayward. The Hayward Fault also ran through the California School for the Deaf and Blind, but the State became nervous, moved the school to another site, and then filled up its old dorms with Berkeley undergraduates.

→ McPhee, J., 1998, Annals of the former world: New York:

Farrar, Straus and Giroux, 696 p.

**4. Plagarism**: This is absolutely prohibited.

***Out and out plagiarism is when the McPhee text is included in an essay or report, but there is no indication at all that this is a direct quotation from anyone, no proper McPhee reference in the List of References, and no indication that McPhee’s work was even consulted in the process.***

The Hayward Fault alone has contributed more than a hundred miles of offset. Running southeast from San Pablo Bay, north of San Francisco, to the latitude of Santa Cruz, it disappears near Gilroy, not far from the San Andreas Fault at San Juan Bautista. In many places, such as Berkeley, the Hayward Fault has Jurassic rock of the Franciscan mélange on one side of it and Cretaceous rock of the Great Valley sequence sort of dredged up on the other side….The Hayward Fault runs not only through Memorial Stadium but also through or very near the Alameda County hospital, the San Leandro hospital, and California State University, Hayward. The Hayward Fault also ran through the California School for the Deaf and Blind, but the State became nervous, moved the school to another site, and then filled up its old dorms with Berkeley undergraduates.

→ [No bibliographic entry]

**9.0** **Library Assignments**

**9.1 The Importance of Technical and Scientific Journals**

As we teach in Engineering 183EW, Technology is Technique plus Communication. Technological as well as scientific research is today generally communication through publication of papers in technical and scientific journals such as *Science*, *Nature*, *ACM Transactions on Algorithms, Environmental Science & Technology,* etc.

For example, the technology of modern computer memory is highly dependant on an contributions in the field of Giant Magnetoresistance. Indeed, the 2007 Nobel Prize in Physics was presented to Albert Fert and Peter Grünberg for their independent discoveries of this principle. Fert was first to publish (Baibich et al., 1988) in *Physical Review Letters*, with Grünberg following the next year in *Physical Review B* (Binasch et al., 1989). These journals are sent monthly to thousands of scientists and engineers, and are the primary means of disseminating research results. In most cases, these papers, especially current ones, are not available on the open web: they’re behind the proprietary walls of the publisher, and someone must pay the entry fee (here at UCLA, the University Library does that for you).

**9.2 Purpose of Assignment**

Your library assignment in Engineering 183EW consists of finding a technical journal in your field, printing or photocopying a paper from that journal, and evaluating the characteristics of the paper.

[Note: There is a significant difference between technical journals such as the *IEEE Transactions* and monthly membership magazines, which are usually glossy, with a lot of photographs, and plenty of advertising.]

*The purpose of this exercise is not to have you find a journal article that you fully understand.* Rather, it is to introduce you to the fact that these journals exist and to the purpose they serve in the technical community. If you’re uncomfortable with what you’re finding (i.e. you don’t understand anything), e-mail Don Browne for some advice, or use a default journal, which hopefully everyone can understand at some level: *The Annals of the History of Computing*.

**9.3 Procedure**

To find a journal in your field, you have two options:

1. You may find an on-line journal by going to the UCLA Science and Engineering Library web site and following the link(s) on the right hand menu to the engineering field closest to your major. This should open a screen with a link to “E-Journals in \_\_\_\_\_\_\_\_\_\_\_\_.”

2. Alternatively, ask one of the librarians to help you find a journal in your field from those shelved on the metal shelves in the reading room of the Science and Engineering Library.

After you print or photocopy the article, do the following, answering questions as appropriate. You may write your answers on the back of the journal paper; there is no need to provide this information as a separate document.

1. Write your name on it.

2. Highlight the abstract and understand its purpose.

3. Find five in-text references and highlight them. These may take the form of some sort of “name-date” references [e.g., Jones (2004); Jones (2004, p. 178); (Jones, 2004); or (Jones, 2004, p. 178)] *or* some sort of a numerical reference [e.g., (12); *(12)*; or 12]. Which of these forms does your paper use?

4. Inspect the list of references cited (the bibliography). What general form do citations take? Can you easily differentiate between a book, a conference proceeding, and a journal article? How many web URLs are included in the list of references? Is there any evidence of Wikipedia? Is the list alphabetized (likely with name-date references) or listed in numerical order?

5. Turn the marked-up paper in to your teaching assistant during discussion the second week of classes.

**9.4 Two Data Base Searches**

Each student must submit ***paper copies*** of two bibliographic searches.

1. One is to be from the UCLA Library Catalog or the UC MELVYL Catalog, and should use both title and subject searches for their team project topic area (hint: ask a librarian to help you find the proper Library of Congress cataloging term for your subject area).
2. The second search should be conducted on a newspaper or journal search engine (such as Proquest for the *New York Times*) and should ideally use some sort of Boolean search strategy.

Paper copies of these searches should be submitted in your discussion section as designated in the Schedule. If your searches result in a large number of results, you need only print out the first web page of each search (generally results 1-20 on MELVYL, for example). Please highlight your search terms; in MELVYL, for example, you will see something like

Title = tsunami

at the top of the page, and please don’t forget to write your name on each search. Please turn these searches in during discussion the third week of class.

**10.0 Oral Presentations**

**Quick Start Guide for Initial Library Searches**

1. Before you can do anything with the University Library’s resources from home, you must have either a BOL Proxy or VPN installed on your personal computer. See www.bol.ucla.edu, and look for the links to “Proxy Server” and “VPN” in the left hand box. Follow the instructions therein.
2. I would like you to do a quick brute force literature search on your team topics (and your Hardin topic, too, since a beginning Hardin bibliography is due the second week).
3. One person from the group should look at your team topic in the New York Times.

4. Another person should do the Los Angeles Times.

5. Another person should do the Washington Post

6. Someone in the group should investigate specialty databases, such as IEEE Publications, which would be helpful, for example, for groups doing Personal Robots or Drones. To reach IEEE Xplore, follow the instructions in Item #3 above and simple type in IEEE rather than a newspaper name.

7. Everyone should wade through Google (maybe only the first two pages) and Wikipedia.

8. Limit your searches to the last three or four years.

9. Print out some of your search results, and bring to discussion on next week to share with your teammates. Your understanding of your topic, even at a rudimentary level, will allow you to start devising a Work Breakdown Structure for your team topic.

To quickly access the various databases mentioned above, go to the UCLA Library’s Engineering 183EW Web Site:

http://guides.library.ucla.edu/eng183

The Databases folder has direct links to the newspapers mentioned above, as well as to most of the key databases useful for Engineering 183EW. The library usually has the web page updated to reflect each quarter’s Engr 183EW team research topics by the beginning of the second week of classes, so please be patient. Two of the library’s “One Minute Guides” are presented on the following pages to show you the ease with which database searches may be made.

Each team will present an oral presentation on their research project to their discussion section. These presentations will take place during the final week of classes. Order of presentation will be determined by lot. Each presentation will be about 35-40 minutes long.

All students are familiar with PowerPoint presentations, and they need little discussion here. However, it may be helpful to visit a web site on how to best prepare PowerPoint presentations, The Oceanographic Society’s *Scientifically Speaking.* (Don’t let the organization’s name turn you off; this little booklet is probably the best out there.) The site is at http://www.tos.org/pdfs/sci\_speaking.pdf

Several other observations may be on order as you prepare your group’s presentation:

1. Don’t use red lettering on a dark (especially blue) background; it’s unreadable. So is white lettering on a pale background, Test your color choices in a classroom if at all possible – what you see on your computer screen may not be what you see coming out of a projector.
2. Each team should pick a standard template and all members of the group should use that template.
3. So that viewers know who you are, place your own name (in small letters) in the lower right corner of your own slides.
4. Don’t use too many slides. A general rule of thumb used by professionals using PowerPoint and other presentation materials is that one slide per minute is about right. This may be increased slightly for a title slide and a conclusion slide, but that’s about all. For Engineering 183EW presentations, anything over 10 slides per individual is probably too many.
5. Pay attention to the rules in *Scientifically Speaking* about how you should ***not*** cram too many words on each slide.
6. If you wish to practice your presentation (a good idea), you may be able to reserve the Science and Engineering Library’s Learning Center or a classroom when otherwise not in use. Contact Browne for details.
7. **DO NOT USE GOOGLE SLIDES** for slide presentations: Material prepared using Google Slides cannot be saved to .pdf form and Turnitin without serious corruption problems.

A copy of the grading matrix we use as a guide to grading the oral presentations is presented on the following page.

# Engineering 183EW Oral Presentation Evaluation

|  |  |  |
| --- | --- | --- |
| Delivery  5: Spoke clearly and fluently and in an engaging manner. Worked effectively within time limitations.  3: Spoke clearly with only a little awkwardness. Finished within the time limits, but at points the presentation may have been rushed or dragged.  1: Failed to meet time requirements. Speaking was often awkward or unclear. | **1 2 3 4 5** | *Additional Comments:* |
| Content  5: Stated thesis clearly. Explained key supporting arguments and defended the thesis against legitimate counter-arguments. Probed the moral and ethical dimensions of the project.  3: A stronger statement and defense of the thesis, with careful attention to possible counter-arguments, would have significantly strengthened the presentation.  1: Thesis unclear. Inadequate grasp of the moral issues at stake. | **1 2 3 4 5** | *Additional Comments:* |
| Communication Tools  5: Integrated content and delivery with appropriate communication tools. Used Powerpoint, well-crafted handouts, or chalkboard with skill and effectiveness. Demonstrated innovation and creativity in presentation.  3: Integrated content and delivery with appropriate communication tools. Used Powerpoint, well-crafted handouts, or chalkboard adequately. Presentation was clear.  1: Inadequate use and/or preparation of communication tools. | **1 2 3 4 5** | *Additional Comments:* |
| Interaction and Response  5: Listened to questions and comments from the class with understanding — and responded clearly. Demonstrated an awareness of the ethical complexities involved.  3: At points, did not fully understand the questions that were posed. Response revealed only a partial grasp of the ethical issues at stake.  1: Difficulty responding to questions or comments made by the class. | **1 2 3 4 5** | *Additional Comments:* |

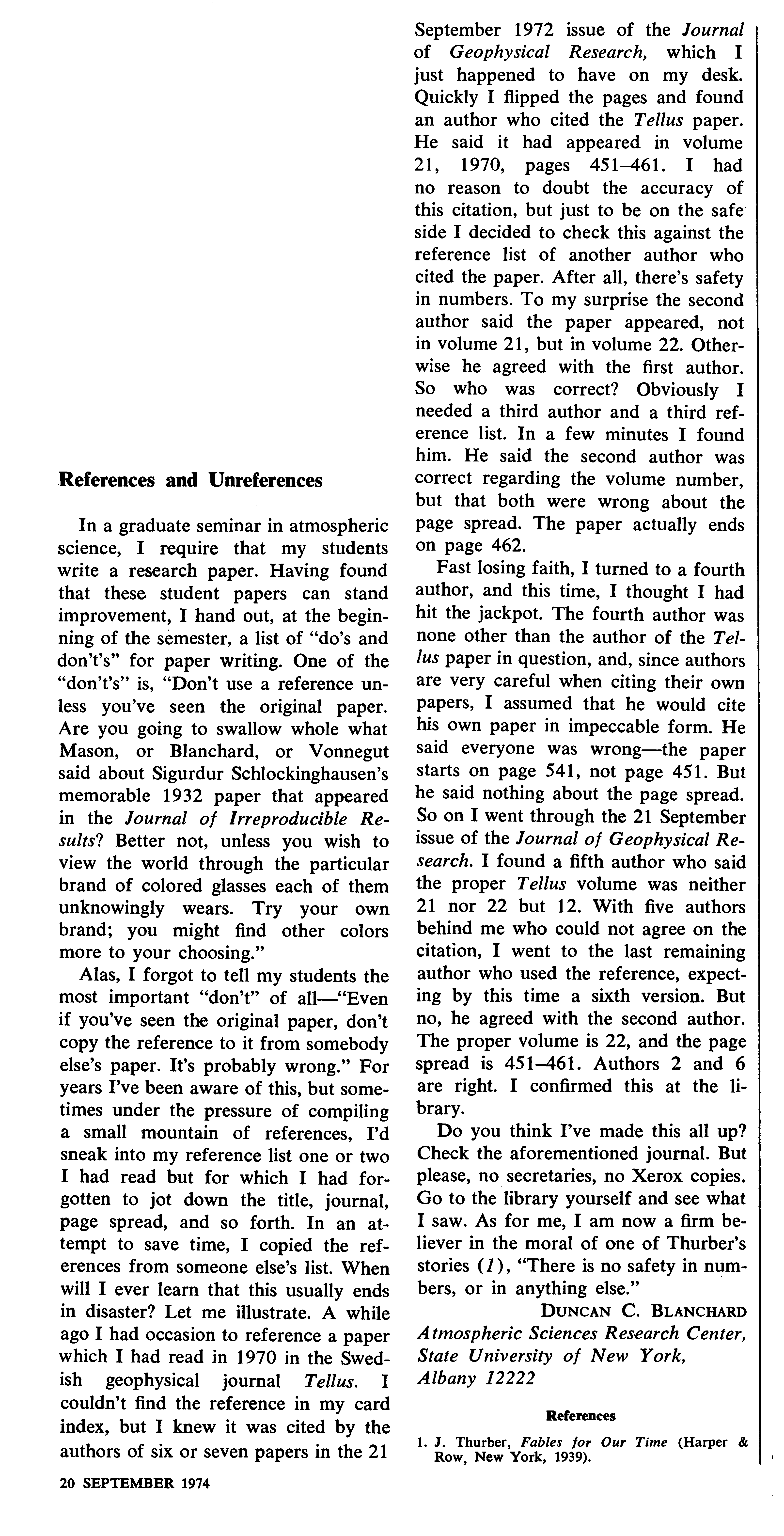
**Overall Comments:**

**11. Miscellany**

**An Owed to the Spelling Checker**

I have a spelling checker   
It came with my PC   
It plane lee marks four my revue   
Miss steaks aye can knot sea.   
Eye ran this poem threw it,   
Your sure reel glad two no.   
Its vary polished in it's weigh   
My checker tolled me sew.   
A checker is a bless sing,   
It freeze yew lodes of thyme.   
It helps me right awl stiles two reed,   
And aides me when aye rime.   
Each frays come posed up on my screen   
Eye trussed too bee a joule   
The checker pour o'er every word   
To cheque sum spelling rule.   
Be fore a veiling checkers   
Your spelling mite decline,   
And if were lacks or have a laps,   
We wood be maid to wine.   
But now bee cause my spelling   
Is checked with such grate flare,   
Their are know faults with in my cite,   
Of non eye am a wear.   
Now spelling does knot phase me,   
It does knot bring a tier.   
My pay purrs awl due glad den   
With wrapped words fare as hear.   
To rite with care is quite a feet   
Of witch won should be proud.   
And wee mussed dew the best wee can,   
Sew flaws are knot aloud.   
Sow ewe can sea why aye dew prays   
Such soft ware four pea seas.   
And why I brake in two averse   
By righting want too pleas.

                    -- Jerry Zar, Dean of the Graduate School   
            Northern Illinois University



Science, v.185, p. 1003, 20 September 1974.

A Scrutiny of the Abstract

by Kenneth K. Landes

|  |  |
| --- | --- |
| |  | | --- | | A B S T R A C T The behavior of editors is discussed. What should be covered by an abstract is considered. The importance of the abstract is described. Dictionary definitions of "abstract" are quoted. At the conclusion a revised abstract is presented. | |

Presumably new editors, like new senators and small children, should be seen and not heard. But unfortunately the Association has elected (the electorate had no choice) an editor who is a nonconformist. For many years I have fretted over the inadequate abstract, and now perhaps I can do something about it--but not by keeping quiet.

Many of the abstracts appearing in the publications, including the meeting programs, of the A.A.P.G. can best be described by the use of a homely word that refers to an infestation by a certain minute organism. The abstract appearing at the beginning of this note is in that category. I regret to say that it is not an extreme case. My collection contains several that are worse. Dean Russell of Louisiana State refers to such abstracts as "expanded titles." They could also be looked upon as a table of contents, in paragraph form, with "is discussed" and "is described" added so as to furnish each subject with the verb necessary to complete the sentence. The reader is left completely in the dark not as to what the paper is about but as to what it tells! The information and the interpretation contained therein remain a mystery unless the reader takes the time to read or listen to the entire paper. Such abstracts can be likened to the "teasers" which your local movie manager shows you one week in the hope of bringing you back next week. But the busy geologist is more likely to be vexed than intrigued by the coy abstract.

To many geologists, especially the tyros in exposition, the writing of an abstract is an unwanted chore required at the last minute by a rule-ridden editor or insisted upon even before the paper has been written by a deadline-bedeviled program chairman. However, in terms of the market reached, the abstract is the most important part of the paper. For every individual who reads or listens to your entire paper, from ten to five hundred will read the abstract. It is much better to please than to antagonize this great audience. Papers written for oral presentation should be prepared with the deadline the abstract date instead of the delivery date. Later discoveries can be incorporated within the paper--and they would miss the program abstract anyway.

My dictionary describes an abstract as "a summary of a statement, document, speech, etc." and "that which concentrates in itself the essential qualities of anything more extensive or more general, or of several things; essence." The definition I like best has been set in italics. May all writers learn the art (it is not easy) of preparing an abstract containing the essential qualities of their compositions! With this goal in mind I append an abstract that I believe to be an improvement over the one appearing at the beginning of this discussion.

|  |  |
| --- | --- |
| |  | | --- | | A B S T R A C T The abstract is of utmost importance for it is read by 10 to 500 times more people than hear or read the entire article. It should not be a mere recital of the subjects covered, replete with such expressions as "is discussed" and "is described." It should be a condensation and concentration of the essential qualities of the paper. | |

From the *Bulletin of the American Association of Petroleum Geologists*, v. 35, no. 7 (July, 1951).  
**12.0** **References Cited**

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**13.0 Turn-in Checklist**

ENGR 183EW Homework Summary Summer Session, 2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Assigned in Discussion** | **Due in Discussion** | **Assignment Name** | **No. of Hard Copies** | **Soft Copy?** | **Turnitin?** |
| Week 1 | **Week 1**  **(June 26-30)** | Autobiography | 2 | Yes | Yes |
| Week 1 | **Week 2**  **(July 3-July 7)** | ECS Problem Statement, Outline, and References  Individual Results of Library Search on Team Topic | 5  1 | Yes>  No | Yes  No |
| Week 2 | **Week 3**  **(July 10-July 14)** | ECS First Submission  Team Work Breakdown Structure  Team Outline and Bibliography | 5  2  2 | Yes  No  No | Yes  No  No |
| Week 3 | **Week 4**  **(July 17-121)** | Team RAM Chart  Library Assignment | 2  1 | No  No | No  No |
| Week 4 | **Week 5**  **(July 24-28)** | ECS Second Submission  Hardin Problem Statement with References  Zeroth Draft of Individual Section of Team Paper  Short (2-3-min) Presentation of Individual Research for Team Rpt | 2  1  (Tm mbrs +  2) | Yes>  No  Yes | Yes  No  Yes |
| Week 5 | **Week 6**  **(July 31-Aug 4)** | Hardin First Submission  First Draft of Individual Section of  Team Paper (submit  electronically to  Turnitin and to your  team members) | 5  {Tm mbrs + 2} | Yes  Yes | Yes  Yes |
| Week 6 | **Week 7**  **(August 7-11)** | Draft of team’s PowerPoint slides | (Tm mbrs +  2) | Yes  Yes | Yes  Yes |
| Week 7 | **Week 8**  **(August 14-18)** | Hardin Second Submission  Team Project Oral Presentations  Final, bound copy of Team Project due on Friday, August 18, not later than 5 pm (see specific instructions in the *Survival Guide*.) | 2  1  2 | Yes  Yes  Yes | Yes  Yes  Yes |

Note: All papers are due at the beginning of your Discussion Section. Late papers will not be accepted.

Check List for Final Team Paper

*This check list, signed by a member of the team, is to be submitted with the Final Report.*

⁪ Printed one sided

⁪ 1.5 Spacing

⁪ 11 pt Times Roman or similar serif font

⁪ Pagination

(title page numbered “i” but not displayed; remainder of front

matter numbered using small Roman numerals ii-……; first page of report numbered beginning 1 in the bottom center)

⁪ Heading and subheadings throughout report (see sample passed around in

discussion section)

⁪ 7-9 pages of text per group member

⁪ In-text citation format is that specified in *Course Manual* (e.g. (Jones, 2009) or

some variant thereof). Other forms of citation (e.g. MLA or bracketed

numbers) should ***not*** be used

⁪ Bibliography is in the form specified in the *Course Manual*.

⁪ Provide two copies of the report:

⁪ Bind one copy with a coil or comb binding (available any photocopy shop)

⁪ Provide one copy unbound – no staples, brads, rings or other devices

(see below)

⁪ Due date is Friday, August 18, NLT 5:00 pm unless other arrangements are made.

⁪ At the time of turn in, a box of large manila envelopes and bulldog clips

(for the loose copy of the report) will be available outside of Boelter Hall

6417 for submission.

*This report meets the requirements noted above*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_