Term Paper Requirements

Each student is required to prepare a term paper on current research topic relevant to the subjects covered in this class. Any paper used for fulfilling requirements of other courses or graduate oral exam **MUST NOT** be recycled in this class. The purpose of the term paper is to demonstrate that you can apply the process analysis techniques learned in this class to an environmental problem of your choosing. The paper must include a statement of an environmental problem or process(es) and analyze the process(es) with the principles learned. The paper should be typewritten, paginated, double-spaced, in Time font, size 12, 1 inch margins (top, bottom, left, and right), and must follow the outline shown below. There is no page limitation, but a good term paper may need 8 to 14 pages of narratives to provide in-depth analysis of a selected topic. Start preparing the outline before the end of October.

Cover page
Abstract
Table of Contents
Introduction
(Of the issue; a few references are needed in the text whenever a fact is stated)
Problem Description
(Including description of an environmental system with complex processes. For example, NAPL present in the subsurface and the contamination of groundwater due to slow dissolution of NAPL in groundwater. In some cases you may need data from literature (e.g., density, solubility, vapor pressure, toxicity, etc.) and in other cases you will have to "make up" information needed (e.g., void volume fraction of NAPL in aquifer). Please provide references for data obtained in the literature and make the arguments that the values you have assumed are reasonable (justify your values/assumptions); provide a sketch of the problem with appropriate labels, etc.)
Current Study (Literature review)
(Summarize the literature on the topic. How do the environmental engineers and scientist tackle the problems under both laboratory and field conditions? What are the fundamental questions formulated from the problem you described above? How did the researchers analyze the processes and design experiments to parameterize the processes? What are the major findings from the studies? You must start from first principles, i.e. mass/energy balance, and include major equations, assumptions, derivations of the equations, solutions, excel spreadsheet, plot, figures, tables as needed)
Discussion
(In this section you should critically analyze the literature. What have been addressed gracefully, adequately, or insufficiently? What are the gaps between laboratory studies and field reality? How can you improve the current understanding with your own dynamics analysis and experimental design based on first principles (energy and mass) ? Be imaginary and creative with emphasis on fundamentals)
References

Reference Format

Books

Mantell C.L. (1968) Carbon and Graphite Handbook. Interscience, New York.

Journal Articles (At least 8)

Guerin, W.F., and Boyd, S.A. (1992) "Differential bioavailability of soil-sorbed naphthalene to two bacterial species." *Applied and Environmental Microbiology*, 58: 1142-1152.

Book Chapters

Ball, W.P., and Roberts, P.V. (1991c) "Diffusive rate limitations in the sorption of organic chemicals," In *Organic Substances and Sediments in Water, vol. 2, Humics and Soils* (Edited by Baker, R.A.), Lewis Publishers, Chelsea, Michigan, pp 273-310.

Website

Non-Aqueous Phase Liquid (NAPL) Cleanup Alliance, Remediation Technologies Development Forum (RTDF), http://www.rtdf.org/

Copy Right Declaration

The review paper should be written solely using your own language based on your in-depth analysis and synthesis of information provided in references. Major statements, facts, and conclusions must be supported by appropriate references. A sentence or several sentences that are directly copied from a reference must be quotation-marked followed by a referred citation. It is strongly suggested that you rephrase, instead of directly quote, the sentence(s). Copying sentences or paragraphs without following the above procedure will be regarded as plagiarism. Once plagiarism is found in the term paper, the student will receive 0 grade on the work and a final grade no better than C for the course. Such a case will also be reported to the Departmental Chair and the Curriculum Committees.

Term Paper Grading (100 points)

Page 1.	Cover page (2 points) Term paper title, course number, names of student and instructor, date, etc.
Page 2.	Table of content (2 points), pagination of the document (1 point)
Page 3.	Abstract (5 points)
Text:	1. Introduction and overview of the problem and the motivation that attracts you for selecting the topic for this term paper (5 points) 2. Fundamental analysis with equations and graphs (15 points) 3. Current study and comments (50 points) 4. Conclusions (5 points) 5. List of references with standard formats and appropriate citations in the text (5 points) 6. Grammar, spelling, technical writing, neatness, etc. (10 points)

Platform Presentation Grading (100 points)

Slides (30 points):

Overall design of the ppt and use of color, Graph, sketch, cartoon, wording, spelling, etc.

Scientific Contents (20 points):

Principles, concepts, models, equations, major viewpoints, conclusions, etc.

Presentation (50 points):

20 minutes of talk plus 10 minutes questions/answers and/or discussion.