

**Advanced Biotreatment and Bioremediation: Term Project
CME 525/ Spring 2004**

This class will have a design project requirement. The format of the design will be a short design that addresses the remediation of a selected contaminated site. Appendices with any calculations and supplemental information can be longer, **but limit the text and figures to ≤10 pages**. The selection of project will come from a list of sites which will have a complete data set of site characteristics (the site data will be made available later in the semester).

The project should state the treatment goals clearly with an overview of how they will be obtained. Each project will entail a different pollutant type, site characteristics, and/or regulatory objectives that will necessitate unique solutions. The basis of the design will come from what you have learned in class together with the case studies. The writing must be in *your own words*. I will give the written project a zero if you use verbatim restatements of published articles. This is skirting the edge of plagiarism, and is not acceptable. Any direct quotes must be in notation.

Only spend as much space as needed to succinctly get the main goals, design review and projected results, and summary; as you only have 10 pages for introductory text, reviews, design considerations and summary/conclusions of the expected results. The paper design will account for **20% of the final grade**. As the field of bioremediation is relatively young, the design projects will be relatively open-ended and may have few or even vague regulatory requirements for clean-up goals. Although this may result in some difficulty in the design process, it more realistically reflects the “state-of-the-science” as currently practiced. As you will learn in class, bioremediation of some pollutants is well evolved and for other pollutants it is in its infancy. Selected designs **must come from the list of topics below**. You will give a poster presentation the end of the semester. You should choose your design project and notify me **by the week of March 29-April 2**.

Design projects MUST come from the following list:

- 1- A MTBE contaminated aquifer
- 2- PCB contaminated sediments
- 3- PAH contaminated sediments
- 4- A PCE- and TCE-contaminated aquifer
- 5- Munitions contaminated soils
- 6- Lead contaminated soils
- 7- A LUST for gasoline
- 8- Soil at a former Atrazine depot facility
- 9- Soil at a transformer storage yard

Poster presentation. Each person will prepare a professional quality poster and give a short oral presentation and answer session with me. The poster session will be on the last day of class and **will constitute 30% of your grade**. You are encouraged to visit your fellow students posters and ask them questions when I am finished with your poster (I

will notice those who does not do this). Please do not put the poster together the morning of the class, I will notice a poor job and this is the single largest component of your grade. Also, know your material well, because I will likely ask you to give me the “2 minute” tour of the poster. Typically posters are made in Powerpoint or with other poster making software. They can be printed out with individual figures put up on backing board or printed out on large poster paper. You will have to fit your poster within a 3’ x 4’ area. I will make available what I consider examples of good posters for your assistance later in the semester.

In general, posters should follow a logical and clear path through abstract, introduction, motivation, discussion of the site and remediation goals, summary, and critical conclusions. Treat this as a serious talk to a professional audience (do not say things like “as we learned in class...”). I will require you to give me an 8 1/2” x 11” mini-version of the poster. This is easily done in poster making software.

Poster text must be legible from several feet away, so use large type (minimum 20-24 pt, but the bigger the better). As you will find out, long abstracts and text sections in large font will start to use all your space, so writing economy is needed. Keep in mind that most people who view posters will only glance at it for a few minutes, so you have to get your point across with a minimum of text. **Pictures and diagrams are worth a thousand words.** Most people (even professionals!) tend to put too much text on their posters, so fight the urge to have everything you say printed out. Text should be bulleted and contain in as few words as possible the core of each topic. Pictures are indeed worth a thousand words. Color presentations on a confusing and poorly constructed poster will not help you get a better grade. Black and white posters are fine if the presentation flows nicely, the figures are clear, and all essential information is included.

Notes on grading and acceptable citations

You will find that **I grade heavily on grammar.** People will judge you on your writing style, and I will as well. With today’s word processors, there is no excuse for misspellings and poor grammar. At the very least, you must perform a spell check and grammar check. Every semester I state these guidelines, and every semester I continue to receive reviews with misspellings. Therefore, to further emphasize the importance of proper spelling, I have the following rule:

Misspelling words will result in a 10% grade reduction on your project paper.

Plagiarism is a violation of the student conduct code and will not be tolerated. All work that comes from another source must be cited properly. All ideas that are not your own or are not generally known should be cited. Go to the original source for the proper citation. Citing a paper that cites another paper is not acceptable. **CITING THE INTERNET AS A SOURCE IS NOT ACCEPTABLE.** WebPages are too ephemeral and tend to have extremely poor acknowledgement and citation of the ideas contained therein. Use of pictures and figures must be properly acknowledged. The use of figures from the Internet may be acceptable only if the figure is properly sourced (try to find the original source) and acknowledged. If in doubt, please see me.

Proper in text citation should use author-date format as in the following:

Researchers have reported that polycyclic aromatic hydrocarbons such as phenanthrene can be biodegraded under denitrifying (Rockne et al, 2000) and sulfate reducing conditions (Rockne and Strand, 1998).

Extensive citations of text should be indented (as in the statement above) in notation. Individual statements of fact should be in your words with the proper citations. Arrange the citations in alphabetical order at the end of the paper in a *references cited* section. You should use the following format (note indentations and spacing):

Journal articles:

Rockne, K. J., J. C. Chee-Sanford, R. A. Sanford, B. Hedlund, J. T. Staley, and S. E. Strand (2000) Anaerobic naphthalene degradation by microbial pure cultures under nitrate-reducing conditions. *Applied Environmental Microbiology*. **66**(4):1595-1601.

Rockne, K. J. and S. E. Strand (1998) Biodegradation of bicyclic and polycyclic aromatic hydrocarbons in anaerobic enrichments. *Environmental Science and Technology*. **32**(24):3962-3967.

Edited books:

Olivier, J.P. and W.B. Conklin (1992) Determination of pore size distribution from density functional theoretic models of adsorption and condensation within porous solids. *In: The effects of surface heterogeneity in adsorption and catalysis on solids*. Einstein, A. and N. Bohr (Eds.). Prentice Hall, New York.

Books and reports:

Gregg, S.J. and S. W. Sing (1982) *Adsorption, surface area, and porosity*. Academic Press, London.

NOTE Always include the unique EPA or other government report number.

The journal name is italicized and volume number is bold for journal articles. The book name (either edited or not) is italicized. All authors must be identified (no et al). Personal communications and conference presentations (unless published in a proceeding) are not generally acceptable within the scope of this project, although they are suitable in many other instances.