# Math 5580 Case Studies in Applied Mathematics*

## Fall 2012, TuTh 10:30-11:45am, MSCS 509

**Instructor**: Dr. N. Ju, @ MS 434. (405)744-5691, `nju@okstate.edu`.
Office hours: WF 2:20-3:20pm and by appointment.

**Objectives**: Develop the ability to solve realistic mathematical problems independently, to discuss the solutions in class, and to write technical reports.

**Prerequisites**: Calculus, Differential Equations and mathematical experience and initiative to learn, on your own, the mathematics to solve the given problems. Knowledge of scientific computing and LaTeX is helpful.

**Text**: None. *The Elements of Style* by Strunk and White, available at OSU library, or a similar one is helpful on technical writing in science.

**Format**: This is not a lecture course. Students will solve a few practical mathematical problems independently, present the progress they've made and questions they have to the class and actively comment on others' solutions during the presentations. The professor will moderate the discussions.

**Grade**: There is no exam. The final grade is based on written reports, presentation and participation of discussion in class. Attendance is mandatory. Late reports without acceptible excuse will be penalized.

**Reports**: Use of LaTeX is suggested. Each Report must be prepared clearly and concisely with a computer word-processing system, containing the following:

1. Cover and title page.

2. Abstract: a one-paragraph summary of the report's contents introducing the subject matter and what the report accomplishes.

3. Table of contents.

4. Introduction: This section discusses the purpose of the report and background information. It should state the problem, describe the method of solution and explain why the problem is interesting.

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*Check `http://academicaffairs.okstate.edu/images/documents/sylatfa.pdf` for general informati on and policy about OSU courses. **Any changes to this syllabus will be announced in class.**

5. Sections forming the body of the report should be consecutively numbered, with first part containing preliminary mathematical material used to set up or solve the problem; the second part discussing different aspects of the problem's solution. All notations and technical terms should be clearly defined and assumptions clearly stated. Important facts or conclusions should be labelled as Lemmas, Theorems, etc., and stated *before* their proofs or derivations. Use displays for important equations and for equations too long to be included in the text; all else should be written in the text, in full sentences. Use a consecutive, consistent numbering system for Theorems, Lemmas and displayed equations to which you later refer, etc.

6. Summary and conclusions: This section summarizes and criticizes the results of the report. Include comments on how realistic or optimal your solution is, how it might be improved, other applications of the results of the report, directions for future research, etc.

7. Acknowledgements: This section, if necessary, expresses thanks to individuals who helped you solve the problem, if there are any.

8. References: This is an alphabetical, consecutively-numbered list of all written sources cited, in the following format:

   [1] Jeanne L. Agnew and Marvin S. Keener, eds., Station Hydro-Turbine Optimization, Industry-Related Problems for Mathematics Students No. C-18.3, Oklahoma State University, 1980.

   [2] Stanley I. Grossman, Calculus, fourth ed., Harcourt Brace Jovanovich, San Diego, 1988.

   [3] G. Strang, Patterns in Linear Algebra, Amer. Math. Monthly 96 (1989), 105-117.

   Notice that the pamphlet containing the problem description [1] is listed here. Technical reports do not contain footnotes. A particular source is cited [2, pp. 32-33] by including in square brackets the reference number, and the page numbers if you wish, at the appropriate place in the text.

9. Appendices: Any mathematical proofs, calculations, tables, etc., that are too long or would interrupt the flow of the report may be included in an Appendix.

**Honesty**: All written work must be your own, no discussions or collaborations on the written reports are permitted. You are not permitted to consult students who have solved any of these problems in this course in a previous semester, nor are you permitted to read their written solutions to these problems. Otherwise, you may consult any written sources or any other person, as long as all your sources are properly documented.