

Applied Calculus Projects – Guidelines for Students

Nature of the Project

Your project should feature a practical problem from the field you are pursuing and require the use of calculus tools. Beyond that, problems might be either well-defined or open-ended.

All projects will have *at least* two advisors – a Subject Area Advisor and a Mathematics Advisor.

Subject Area Advisor

Your Subject Area Advisor will most likely be the person (e.g. work supervisor, faculty member, postdoc, etc.) who suggested the project to you. This person might simply hand you a project and say “Come back when you are done” or schedule meetings with you to discuss it. How you work with your Subject Area Advisor is between you and her/him.

Math Advisor

Your Calculus course Instructor will be your Mathematics Advisor. You may have more than one Mathematics Advisor (any Faculty or Graduate student in the Department of Mathematics & Statistics).

How to Select a Project

The problem for your project can come from a number of different sources. If you have a job or an internship, your work supervisor might have a problem that is important to the organization you work for. If you have an undergraduate research position, your research advisor can be a source of project ideas. Or, you might have already taken a class or two with faculty members in your major and they might be willing to suggest a problem for you to work on. The best source of a project might be you though. Consider the things you are interested in and look for an application of calculus to them. If you can find one, you can probably build a project around that.

If you cannot obtain a project from one of these sources, you can meet with

Dr. Scott Campbell (Engineering) or
Dr. Gordon Fox (Biology and Related Fields).

Dr. Campbell and Dr. Fox are project coordinators and can either suggest a problem for you or direct you to a faculty member within your discipline. Alternatively, if you have an idea of your own for a problem, they can help you develop it. *See the attached schedule for their office hours.*

Publication in the Undergraduate Journal of Mathematical Modeling: One + Two

Selected projects will be published in the open access electronic journal UJMM: 1+2 (<http://ciim.usf.edu/ujmm>) under a Creative Commons Attribution Non-Commercial Share Alike 3.0 license. Submission of a project report will imply that you are giving the editors of UJMM: 1+2 permission to publish your report in this journal, should it be selected.

Project Deadlines

- The deadline for selecting a project will be given to you by your Calculus Instructor.
- The deadline for obtaining a project through Dr. Campbell or Dr. Fox can be found on *the attached schedule*.
- If you receive a project through Dr. Campbell or Dr. Fox there is an additional requirement – you must email or provide a hard copy of a draft of your report to your Subject Area Advisor according to *the attached schedule*. This is not the final submission – it is an opportunity for you to receive feedback before you officially submit your project.
- The official due date of the project (final submission) – the day that it must be uploaded – will be given to you by your Calculus Instructor.

Project Checklist

1. Find a Subject Area Advisor for your project, by _____.
2. Meet with your chosen Subject Area Advisor and identify a problem, by _____.
3. Check back with your Mathematics and Subject Area Advisors concerning your understanding of the problem and a mathematical approach to solve it. Consult with them about any difficulties or questions.
4. Show a draft of your report to all advisors no later than _____.
5. Submit final copy online, by _____.

Project Submission

Your project (equations, graphs, diagrams, pictures included) should be presented as a Microsoft WORD document.

- Clarity of writing is important. At the very least, be sure to use your spell-checking and grammar-checking facilities.
- It is very important that you include the correct first and last names of your project advisors. Also be certain to include their correct USF Department or Company Affiliation. This information as well as your own correct first and last name is crucial for proper identification of your project upon online submission.
- You will need to prepare a Project Summary in advance. This is a concise abstract type description written in the third person. The Project Summary will be posted online so it should be understandable to a general audience. Therefore it should be focused on the subject matter rather than mathematical formulas and details.
- You should submit your project through the PROJECT SUBMISSION link provided by your Calculus Instructor. The check list of the required and optional data appears as the first page in the submission process.
- You may be required to provide your advisors with a hard copy of your project.

Report Format

Project submissions must be in the following format:

(a) Cover page and Problem statement.

The cover page should use the following template, followed by the problem statement (*see next page*):

Your section MATHEMATICS – ENGINEERING PROJECT *
(e.g., MAC2282.901)

PROJECT TITLE

Student: First Name Last Name

ADVISORS

Mathematics Advisor: First Name Last Name
Affiliation**

Subject Area Advisor: First Name Last Name
Affiliation**

Problem suggested by: First name Last name
Affiliation**

Spring 2013 (use current semester and year)

PROBLEM STATEMENT

Provide an exact statement of the problem as suggested by its author.

* or MATHEMATICS – MEDICINE PROJECT,
MATHEMATICS – BIOLOGY PROJECT,
MATHEMATICS-ENVIRONMENTAL
SCIENCE PROJECT, etc.

** For instance, Electrical Engineering, University of South Florida, Tampa, FL.
Research and Development, Raytheon Technology. St. Petersburg, FL.
Department of Radiology, Tampa General Hospital, Tampa, FL. , etc.

(b) Table of Contents. Include the following sections in the table and give the page numbers.

Contents

1. Abstract	
2. Motivation	P
3. Mathematical Description and Solution Approach	A
4. Discussion	G
5. Conclusions and Recommendations	E
6. Nomenclature	#’s
7. References	

Appendix (calculations, graphs, pictures, spreadsheet information ...)

(c) **Abstract.** The abstract is a short summary of your project report – it should not exceed one or two paragraphs. It should concisely state what you did, how you did it, and what conclusions you drew from the results. The abstract will be posted online so it should be well written.

(d) **Motivation.** In this section you should give some background about why the problem is important to science or engineering. You should also describe the problem within its engineering or science context and provide the objective for the project.

(e) **Mathematical Description and Solution Approach.** In this section, you should formulate the mathematical approach to solving the problem – **providing the relevant equations**, describing the mathematical tools you used and outline the procedure used. Do NOT simply list the equations – use text between them to provide a clear understanding of them to the reader.

(f) **Discussion.** Here, you should provide the results and discuss them. Did you meet the objective of the project? Were they as expected, or were they counter-intuitive? What implications do your results have to the problem at hand and to the field in general?

(g) **Conclusions and Recommendations.** Give the basic conclusions of your work. This will be somewhat similar to what is in the abstract but with a little more detail – for instance, including a summary of your interpretation of the results. You should also make a few recommendations – such as things a person doing the same project might do differently or ideas for a new study that is suggested by your results.

(h) **Nomenclature.** List the symbols that you use in your report. For each symbol, provide a description of what it represents and its units. Example:

P	Pressure	kPa
T	Temperature	°C
v	Velocity	m/s
V	Voltage	V

All units used should belong to the same measuring system: Standard (English) or Metric (SI). **Carefully check whether the units agree and are balanced on both sides of each equation.**

(i) **References.** Any work or ideas that you have taken from someone else should be cited directly in the text of your report. This includes any figures that you might download from the web. Do your best to find and cite the original source of information rather than the secondhand source.

At the end of the report should be a list of references that were cited. Book and scientific journal references are strongly preferable to webpages.

(j) **Appendices.** You might have detailed calculations, spreadsheets or computer programs that were used to obtain your results but do not belong in the main report. If so, you should place these materials in appendices and refer to them as needed in the report.

SPRING 2013 SCHEDULE:

Project Office Hours and Deadlines

ENGINEERING

Dr. Scott Campbell

Email: campbell@usf.edu

Office: ENC 3405

Office hours: Monday, Tuesday and Friday 10 am - 12 pm, Thursday 4 - 5 pm

Students can also make appointments (encouraged) by clicking on the e-schedule link:

<http://che.eng.usf.edu/undergraduate/advisorsMessage.htm>

Contact window for initiating projects: Monday, January 14 through Friday, April 12.

Dr. Campbell will examine student project drafts up to the day it is due to the corresponding calculus instructor.

BIOLOGY and RELATED FIELDS

Dr. Gordon Fox

Email: gfox@usf.edu

Office: SCA 330

Office hours: Monday and Wednesday 9:30-10:30 am

Contact window for initiating projects: Wednesday, January 23 through Wednesday, April 3.

Students who have already seen Dr. Fox about initiating a project before then can consult with him later, but – they need to start projects in advance.

Drafts due: Monday, April 29

Final versions of projects to be reviewed by Dr. Fox must be submitted online no later than May 1.