

## PHYS-4007/5007: Computational Physics

### Problem Set 2 (Due: 3 March 2023)

#### 1. (50 pts) L<sup>A</sup>T<sub>E</sub>X Exercise: Writing a Research Proposal.

For this assignment, you are to get experience with the L<sup>A</sup>T<sub>E</sub>X mark-up language by writing a research proposal. A proposal template file can be downloaded from the Course Web Page (next to the “Problem Set 2” link). Once you download this template file, “*hw2proptemplate.tex*,” edit it, then compile it in L<sup>A</sup>T<sub>E</sub>X. You will likely have errors associate with it. Keep on making editorial changes until you are able to produce a PDF file. Send this proposal to me by the due date above at **lutter@etsu.edu**. Send me both the L<sup>A</sup>T<sub>E</sub>X file (the file ending in ‘.tex’) and the PDF output (the file ending in ‘.pdf’) from your L<sup>A</sup>T<sub>E</sub>X run as **attached files** from your mail utility.

This proposal can deal with any research topic involving computational physics, such modeling galaxy collisions, stellar interiors, heat flow through various materials, etc., using numerical techniques covered in class. Details describing what should be included in such a proposal is included below. Not only will you gain experience in L<sup>A</sup>T<sub>E</sub>X programming, you will also gain some experience writing professional scientific research proposals.

Your Research Proposal must contain the following items:

Section Number	Proposal Item	Page Limit
(1)	Cover Page	1
(2)	Proposed Science Program Summary (Summarize the topic you are researching.)	1
(3)	Scientific Justification (How you will approach the problem and what questions you plan on answering with this project.)	4
(4)	Plan of Work (Which operating system, machine, and programming language you plan to use. Steps you will take to answer the above mentioned questions.)	2
(5)	References	1

Note that for “real” science proposals, one also would include a budget for money that you are requesting from a granting agency. For this proposal, you will not have to worry about a budget section.

## **0.1 Cover Page.**

The Cover Page must contain the title of your project; your name; your institution; the date on which you submit this proposal; your class status (*i.e.*, Junior, Senior, or Graduate); your major; the machine architecture, operating system, and programming language you will use.

## **0.2 Summary.**

This page contains an abstract that summarizes your proposed research. See the sample proposal on the website.

## **0.3 Scientific Justification.**

This section contains up to 4 pages of text that describes the science behind your work and what you hope to achieve from this research (*i.e.*, questions you plan to answer). Please note that figures, tables, and equations are very useful to review panels in ascertaining whether or not your proposal is worth pursuing. This section is where you “sell” yourself to the scientific community.

## **0.4 Plan of Work.**

This section contains up to 2 pages that describes the methods you plan to use to see to the successful completion of your work. Talk about the programming language, operating system, and machine architecture you will use and what numerical methods you will use in this code (this is where you dazzle the review committee with equations). Also give a timeline on when you will complete various steps in your research (assume you will be finished by the end of the semester).

## **0.5 References.**

List the references that were cited in your Scientific Justification and Plan of Work. See the sample proposal for an example of how one presents such references.