Syllabus for PHY 490 Research Proposal

Dr. Christensen
2018 Spring Term

W 9:00–9:30, S226; plus 30 minute private meeting TBD

```
PHY 490 (1) Prerequisites:  PHY 322.
The student will create a written proposal for a research project that consists
of a timeline, budget, and defined accomplishments.  This proposal will be based
on background readings and often some preliminary data measurements to verify the
feasibility of the project.  It is possible to successfully complete this course with
the conclusion that the project is not feasible or not affordable.  In this situation,
the student must repeat the course with more realistic goals.  The proposal will be
reviewed by departmental faculty and the Chair's approval is required to take PHY 491.
```
This course may be repeated once for additional credit.

---

1 Course Goals

The goals of this course are, by the end, for students to have (1) selected, (2) researched, and (3) organized a *viable* topic for their senior research project, and to have (4) identified a faculty member to supervise your future research project. The organization of the proposal will involve (3a) defining an achievable objective, (3b) itemizing an affordable budget, and (3c) setting realistic benchmarks against which the research project grade will be based.

2 Student Outcomes

Upon successful completion of this course, students (1) will develop the ability to organize a project; (2) will have an introductory experience with a literature review through such journals as *American Journal of Physics*, *The Physics Teacher*, *Physical Review*, and other online publications; (3) will be able to create a budget; (4) will be aware of a variety of professional grant proposal procedures; and (5) will have experience with oral presentations.

3 Policies

Attendance: Attendance is mandatory at the once/week half-hour group meetings. An additional half-hour will be schedule with each individual for each week. You are expected to spend an additional one to two hours per week outside of our meetings. If "something comes up" and you cannot meet at the scheduled time, contact me (note, email, voice mail, courier, same-day word-of-mouth) **before** the meeting time. Class meetings may be rescheduled throughout the semester.

Athletics: It is your personal responsibility to inform me if you will miss class **before** you miss class. Even if an email is being sent on your behalf, see me before or after class so that I can inform you of variations from the syllabus. It is your responsibility to inform me of incoming report cards before you bring them so that I can have a grade available.

Office Hour Policy My schedule (with office hours) is posted on my office door.

Expectations: Grades are tied to numerical scores according to the criterion:

"A"	Outstanding	> 90
"B"	Above Average	80-90
"C"	Average	70-80
"D"	Below Average	60-70
"F"	Did not successfully complete requirements	< 60

"+" is the upper third of the range.
"−" is the lower third of the range.

Due to the nature of the course and the variety of proposals possible, these boundaries may shift to lower numeric values. (That is, an 88% might be an A, but a 92% will never be a B.)

Behavior and the TMC Saints Community Standards: Students are expected to conduct their behavior in the classroom, outside the classroom and online, in a manner that reflects the Community Commitments described in the TMC Saints Community Standards. The Standards identify five community commitments - individual worth, personal integrity, critical thinking, self-control, and community responsibility. The students of our community are expected to uphold and portray these characteristics in all aspects of their life while enrolled at Thomas More College. As a student at Thomas More College, you are expected to understand and know the policies and procedures as outlined in the Saints Community Standards, Sexual Misconduct Policy and the Catalog. Please visit `http://www.thomasmore.edu/studentlife/handbook.cfm` to learn about all the policies.

4 Services

Students with Accommodations: In compliance with Thomas More College policy and section 504 of the Americans with Disabilities Act, appropriate accommodations for students with disabilities are available. If you have a documented physical or learning disability for which you require special accommodations, please see John Hennessey, Assistant Director of the Institute for Academic Excellence at 344-3507 or hennesj@thomasmore.edu, as soon as possible. This includes students who have previously received accommodations at TMC.

5 Schedule

Week	Day	Topic
1/8	M	Syllabus, Organization of the term
1/15	M	========== **MLKjr Day - No Class** ==========
	$\boxed{W_1}$	Discuss the format of professional research proposals
1/22	M	Physics Library, AJP, TPT, etc. Online journals
1/29	$\boxed{M_2}$	Discuss Research Ideas
2/5	M	Physics Library, AJP, TPT, etc. Online journals
2/12	$\boxed{M_3}$	Selection of Research Topic
2/19	M	Refinement of Project: Discussion of realistic goals, brainstorm ideas

. . . Continued. . .

Week	Day	Topic
2/26	M	Refinement of Project: Meet with potential Faculty Advisors
3/5	M-F	========== **Spring Break** ==========
3/12	M_4	Preparation for the TMC Research Forum
3/19	M_5	Progress Report: Budget Review
3/26	M_6	Progress Report: Final Refinements
	W	TMC Research Forum
4/2	$M_{7,8}$	Presentation Preparation
4/9	M_9	Presentation Practice
	F	========== **Easter Break** ==========
4/16	M	========== **Easter Break** ==========
	W_{10}	Presentation Practice
4/23	M_{11}	Final Presentations
4/30	M_{12}	(Finals Week, Final Report Due)

6 Assignments

The following assignments may evolve during the term, depending on the results of your individual discoveries and interests.

1. **What does a grant proposal look like?** [30 points] Search the web for proposal opportunities. Download FOUR current funding opportunities: include the organization, descriptions of the program, the goal of the funding opportunity, the information required by the granting program, and any forms necessary. You must include at least two of the following organizations:

NSF	National Science Foundation
APS	American Physical Society
AIP	American Institute of Physics
NASA	National Aeronautics and Space Administration (This might be the national organization, or NASA-KY, for example)
NIST	National Institute of Standards and Technology
DOE	Department of Energy
DOD	Department of Defense

   You must include at least one of the following types of grant:

SBIR	Small Business Innovation Research
STTR	Small Business Technology Transfer
REU	Research Experience for Undergraduates
EPSCoR	Experimental Program for Stimulating Competitive Research

   You will turn these in with a cover-page that summarizes the opportunities. We will meet on the day this is due so you can discuss what you learned from the investigation. The assignment will be graded on the following rubric:

10 pts	Cover page well organized and provides a useful summary.
4x5 pts	Each of the four funding opportunities is clearly identified (include web-links) and includes the information requested above.

2. **Three draft ideas**: [20 points] Provide a cover letter with three ideas to give you direction for your proposal.

5 pts	The cover letter should be addressed to Dr. Christensen and the Thomas More Physics Department and should include a brief statement of what you would like to do after you graduate (if you plan to continue in graduate school, then consider a discipline). This does not need to be a single intended direction, but might indicate several possibilities. You might indicate directions you do not want to go. You might indicate theoretical physics or experimental physics, engineering (which branch or branches), astronomy, mathematics, computational physics, computer games, whatever. More math? less math? more hands-on? more computers? overlap with chemistry? biology? history? teach? research? industry?
3x5 pts	Summarize three seed-ideas. The point of this class is to add flesh to the skeleton ideas you start with. This assignment is asking for skeletons only. What ideas are cool to you? Do you want to build something? Do you want to model something in a computer (traffic flow patterns? Weather? time for digestion of dinner?) Do you want the results of your project to

be continued by future students? will the project require the math and physics club to come together and build something huge? Do you want to be a project manager? Does the project involve dissecting departmental gold fish? Do you have a relative who does something cool? Have you noticed something peculiar (your tongue sticks to metal in the cold?) that might be investigated? **give whatever level of detail is appropriate**. You will be investigating one or two of these as well as something not on this list.

3. **Idea Selection**: [25 points] This is due on Feb 13. Since the projects will vary in scope and requirements, the rubric for this is that it is on time, clear, and reasonable. You may change your topic any time between this date and Spring Break without penalty; but you will lose 1 points per weekday that this is turned in late. If you do not have a topic *before* Spring Break, your grade for this assignment will be a zero.

4. **Project Outline**: [20 points] To do list, with dates, people to talk to, permission required, list of equipment with where and how to price it.

5. **First Draft of Report**: [25 points] *Draft* Grant Proposal, will include: description of project, budget, schedule of deadlines for project, and accomplishment benchmarks (quality, %-completion, maintaining schedule) with weights for importance for use in determining grade by project supervisor. Details of expectations will be provided as this date nears

6. **Second Draft of Report**: [25 points] *Draft* Grant Proposal. Grade will depend on response to graded First Draft. Details provided on returned First Draft.

7. **TMC Research Forum Participation**: [25 points/summary x 2 summaries] During the TMC Research Forum, you will select two projects, read their poster (before the forum), take notes, develop two good questions (requires prior approval), interview the researcher, and write a summary of the research including answers to your questions.

8. **First Draft of Presentation**: [10 points] You must give your oral presentation three times. At least two of which must be for the class. The first presentation will be graded based on Sufficient Amount of Information.

9. **Second Draft of Presentation**: [15 points] You must give your oral presentation three times. At least two of which must be for the class. The second presentation will be graded on Organization of the Information. Five points are for response to comments from the first draft.

10. **Third Draft of Presentation**: [15 points] You must give your oral presentation three times. This third draft might have other faculty of guests in attendance for broader feedback. The third presentation will be graded on Presentation Style. Five points are for response to comments from the first two drafts.

11. **Final Presentation**: [50 points] This presentation will be for the Faculty and students of the Math and Physics Department, plus anybody else you care to invite. Rubric provided at end of term

12. **Final Report**: [75 points] Rubric provided at end of term

There are a total of 400 points that can be earned through the term. Your grade will be summed and reported as a percentage of possible points.