

Syllabus for NSC 220: Anything Physics

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2018 Spring Semester: : MWF 11:00–11:50, S 120

Textbook: “The Physics of Everyday Phenomenon” 8e by Griffith & Broising

NSC 220 Anything Physics (3) Prerequisites: Some algebra skills
Once one understands the general concepts of motion, forces, and energy, then all concepts of physics are accessible. The first portion of the course will introduce these ideas to lay down a common language. The rest of the course will cover whatever physics topics the class deems interesting. Students will leave with the ability to recognize physics in their daily life (such as traffic accident reconstruction, gear ratios, refrigerator thermodynamics, physics of the body) and a conceptualization of some physics they may see in the news.

1 Goals and Outcomes

1.1 General Education Goals: To Provide Knowledge, Skills, and Perspective

Consistent with the mission of the institution (<http://www.thomasmore.edu/about/mission.cfm>) this course is intended to help you examine your place in the world. Throughout this course, you will have the opportunity to develop your communication skills, your critical thinking skills, and your understanding of the laws of nature. Your verbal communication skills will be developed through small-group discussions, asking coherent questions during class, responding coherently during class, and if you choose to take advantage of my office hours. Your written communication skills will be developed with essay questions on the homework and exams. Your critical thinking skills will be developed as we evaluate the reasoning the tries to explain how we know what we know about the physical world around us. You will be asked to evaluate your own and your colleagues' ability to express the reasoning underlying our understanding of the world. This will also involve evaluating the view of the world that you have and that others have.

These skills will be developed in the context of developing an understanding of the laws of nature and the patterns we can see everyday in the physical world around us. The course is organized in such a way as to develop habits of curiosity, reflection, and independent inquiry.

1.2 Departmental Goals: To evaluate and understand the patterns of the physical world

Through the class discussion and lecture, you will be exposed to *the principles and foundations of classical physics* at a level that *introduces* new material. **However, hearing information – even if it sounds reasonable – does not equate to understanding relationships or techniques.** Solving the homework problems, on the other hand, *will* help you to incorporate these physics principles into your general understanding of the physical world around you. Through this course, you will be trained in a variety of *problem solving techniques and skills* at an *introductory* level.

1.3 Goals of the Instructor: To Provide Training to Think Like a Physicist

I consider the primary goal of this class as training for how to critically analyze the physical world around you. Using the three pillars of this course (**Motion**, **Force**, and **Energy**) will enable you to think about new topics the way scientists do. These three concepts are both *fundamental* and *powerful*, because they capture the essence of the discipline and enable one to understand previously unrecognized relationships.

We will test the idea of having fundamental and powerful concepts by relying on them as we investigate topics of your choice through the second half of the course.

1.4 Impact of Goals on Expectations

Your grades on the homework and exams will reflect your knowledge of the principles and foundations, your ability to express these mathematically, your ability to describe them in English, and your ability to reason through new situations. The point of turning in work is to show me how well you understand the material – **include your misunderstandings** so that I can adjust the way I teach to you as individuals. The point of grading work is to show you both how well you understand and how well you communicate that understanding in comparison (through my judgement and experience) to typical students at this same level of experience. Please review returned homework and exams to better learn what you didn't understand. I encourage you to compare your returned work to the posted solutions or to come ask me clarifying questions.

1.5 Student Learning Outcomes

The content of this course will be used as a platform to teach you how to self-assess your understanding and how to ask appropriate questions with the goal of developing your understanding. After successfully completing this course, students should be able to

1. use the fundamental and powerful concepts of motion, force, and energy to understand new topics
2. identify relevant and significant information in a physics textbook
3. use the fundamental and powerful concepts of motion, force, and energy to explain new concepts
4. interpret equations and variables for appropriate use in word problems
5. solve quantitative descriptions of physical situations.

2 Grading

20% **Homework:** Homework will be assigned for each lecture. The “Assigned” problems will be turned in on the day of the lecture and 1 point given for every problem completed, independent of correctness. The point of these is to prepare the students for asking questions during class in preparation for the daily quiz. The “Due” problems will be turned in after the chapter has been discussed and 5-10 points will be awarded as a measure of the correctness of the work. The point of these problems is to prepare the students for solving complex exam questions. Homework makes up 20% of your grade. There will be worked out problems posted to the Canvas class web-site to help you figure out the assigned problems.

Extra Credit: Extra Credit will be granted to those who find mistakes in the book, lecture, and/or homework solutions. You must write up and hand in a brief explanation of *what* is wrong, *why you think* it is wrong, and what it *should* say.

15%
15%
15%
15% **Exams:** There will be three tests during the semester. Each test is worth 15% of your grade (total 60%). The exams will be primarily word problems with algebraic solutions (very modified homework problems). There will also be a few questions which are conceptual (short answer, multiple choice, or true/false) rather than algebraic.

+20% **Final Exam:** The final exam is comprehensive and is worth 20%. The final will be the same format as the other tests; but, due to the wide variety of topics, you will be given choices on which questions you decide to answer.

Grades: Final grades will be reported as a percentage of the total earned points weighted by the percentages above. If at any time during the semester you are curious about your grade, I have an Excel worksheet which can printout a summary of your individual grades. Expect the grading scale to be 90-80-70-60, although I reserve the right to adjust this slightly. I consider a score of 75% (mid-C) to be average and to reflect a typical effort in the course.

Expectations: Grades are tied to numerical scores according to the following criterion. I consider a mid-C to be average for the typical non-physics science majors.

"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.	

If you find yourself saying, "Oh... That's good enough..." then you are likely headed for a C.

Students who have a grade at the border at the end of the term will be re-evaluated based on their participation during class throughout the term.

3 Policies

Just as sports, music, carpentry, and any other skill requires practice, to do well in physics requires practice – Expect to spend time on this class. If you feel you are spending too much time on it, please come to office hours and ask for suggestions. Please, bear in mind that the sooner you ask, the more benefit you will get.

Attendance: Physical attendance is officially mandatory. Mental attendance is appreciated (not to mention helpful). If "something comes up," contact me (note, email, or voice mail) **beforehand**. If you cannot contact me, then tell a friend to contact me that same day. My contact information is at the top of the page.

Athletics: It is your personal responsibility to inform me if you will miss class **before** you miss class. Even if you think an email is being sent on your behalf, see me before or after class so that I can let you know of any variations from the syllabus. If your sport requires you to have a grade report filled out during the semester, I consider it your personal responsibility to inform me that you are going to bring the signature page before you bring them so that I can have a grade available. Please reread **Attendance** and **Missed Exams**.

Late Policy: No credit will be given for any homework worked in class regardless of who is actually in attendance that day. Homework assignments which are turned in late lose 5 points per day (per *day* not per class-day – Sa and Su together count as a single day).

Missed Exams: Make up exams **must** be scheduled before regular exam time. Documented, unforeseen events will be dealt with on a case-by-case basis.

Office Hour Policy My office hours are posted on my schedule located on my office door. I prefer that you visit during office hours, but I am in my office most days from about 8:30am to about 4:30pm. You are welcome to stop by whenever you have a question. Be aware that my posted schedule also lists times which I will *probably* be in my office. If you call ahead and I am busy, we can find a time that suits us both. Be aware that in the unlikely event we cannot match our schedules, there is a tutor center available.

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.

Tutor Services: Thomas More College provides some tutoring services for all students (details can be found at <http://www.thomasmore.edu/academics/support.cfm>), these include:

- face-to-face writing center, located in room 2207,
- a face-to-face math and physics tutoring center, located around the corner from the elevator on the second floor of the Science wing,
- students can request a personal tutor for these or other subjects at this website (http://www.thomasmore.edu/academics/support_request.cfm)
- students have access to SmartThinking online tutoring. For details, contact John Hennessey, Assistant Director of the Institute for Academic Excellence, at 344-3507 or hennesj@thomasmore.edu.

Academic Coaching: Students who would like guidance in time management, study skills, organizational skills, planning, and stress management can contact John Hennessey, Assistant Director of the Institute for Academic Excellence, at 344-3507 or hennesj@thomasmore.edu.

Additional information: Course Catalogs on the web: <http://www.thomasmore.edu/registrar/coursecatalogs.cfm>

5 Tentative Schedule

The following schedule lists concepts you should be familiar with when you walk into class on the given day. You will also be provided homework problems from these sections. “Assigned” problems from that section should be attempted by that day. “Due” problems will be collected on the subsequent boxed-day.

* - 3/17: Last day to drop with “WP” and † - 3/13: Midterm Reports.

Week	Day	Topic: Know these topics before class	Pre-class Readings
1/8	M	1. Introductions: Syllabus, Expectations, Math Questionnaire	1.4-5
[Meaningful Measurements]	W	2. Motion: Position, velocity, acceleration	2.1-3
	F	3. Graphs of motion: linear, parabolic; interpreting graphs	2.4
1/15	M	===== MLKjr Day - No Class =====	
[Measuring Motion]	W	4. Constant acceleration: Bringing together observations, math, and graphs	2.5
	F	5. Free-fall: the effect of gravity, falling and throwing up	3.1-3
1/22	M	6. Free-fall: throwing up and throwing out	3.3-4
[Constant Acceleration]	W	7. Take aim: parabolic trajectories	3.5
	F	8. Newton’s Laws: Newton’s 1st and 2nd	4.1-3
1/29	M	9. Review homework, test prep, more Newton	4.2-3
[Newton’s Laws]	W	10. \Rightarrow Test 1 \Leftarrow	\Rightarrow 1–3 \Leftarrow
	F	11. Newton’s Laws: Newton’s 3rd	4.4
2/5	M	12. Newton’s Laws: Forces	4.5
[Friction]	W	13. Circular Motion: Centripetal vs Centrifugal	5.1-2
	F	14. Circular Motion: Going in circles	5.2-3
2/12	M	15. Newton’s Gravity: The Solar System	5.3-4
[Hooke’s Law (springs)]	W	16. Orbits: Satellites	5.5
	F	17. Work and Power: Simple Machines	6.1
2/19	M	18. Review homework, test prep, more Newton	6.2
[Pendulums]	W	19. \Rightarrow Test 2 \Leftarrow	\Rightarrow 14–16 \Leftarrow
	F	20. Kinetic and Potential Energy: the energy of motion and the energy of position	6.2-3
2/26	M	21. Conservation of Energy: mechanical energy	6.4
[Conserve Energy]	W	22. Simple Harmonic Motion: pendulums and springs	6.5
	F	23. How to see Physics in your daily life (esp. during spring break!)	
3/5	M-F	===== Spring Break =====	
3/12	M	24. Discussion of experiences	
[Oscillating Springs]	W	25. Momentum: Rethinking motion; rethinking Newton’s laws	7.1-2
	F	26. Transferring momentum: rethinking Newton’s Laws	7.2-3
3/19	M	27. Collisions: elastic and inelastic	7.4
[To be Determined]	W	28. 2D Collisions: Playing pool	7.5
	F	29. Choosing the future topics	
3/26	M	30. Review homework, test prep, more physics	
[No Lab]	W	31. \Rightarrow Test 3 \Leftarrow	\Rightarrow 17–19 \Leftarrow

... continued...

Week	Day	Topic: Know these topics before class	Pre-class Readings
	F	===== Easter Break =====	
4/2	M	===== Easter Break =====	
[To be Determined]	W	32. Topic 1:	
	F	33. Topic 1:	
4/9	M	34. Topic 2:	
[To be Determined]	W	35. Topic 2:	
	F	36. Topic 3:	
4/16	M	37. Topic 3:	
[To be Determined]	W	38. Topic 4:	
	F	39. Topic 4:	
4/23	M	40. Review homework, test prep, more physics	
[Lab Final]	W	41. \Rightarrow Test 4 \Leftarrow	\Rightarrow 20-21, 23-24 \Leftarrow
	F	42. Review for Final	
5/4	F	43. Final exam : 8:30–10:30	all
[Make-up Lab week]			