# Department of Physics and Astronomy
# Physics 262 (Spring 2022) - University Physics III

Instructor: Dr. Paul So

Last Modified: January 20, 2022

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| **Lecture**: Innovation Hall 105 (on campus in person), 9:00-10:15a (Tu & TR)<br>**Exams**: Innovation Hall 105 (on campus in person), Feb 24, Apr 7, May 12<br>**Office**: Planetary Hall - Room 203B<br>**Phone**: (703) 993-4377<br>**email**: paso at gmu dot edu<br>Office Hours:<br>• Tuesdays 11a-1p (in-person)<br>• Remote format: Please send email for time and zoom link<br><br>**Text Book**: University Physics with Modern Physics, vol.1, 2 & 3, *14th Edition*, by Young and Freedman (with Mastering Physics) | Grading:<br>• Exam #1 (Feb 24 Thur 9:00a-10:15a) - 25%<br>• Exam #2 (Apr 7 Thur 9:00a-10:15a) - 25%<br>• Final (May 12 Thur 7:00a-10:15a) - 30%<br>• Homeworks: 10%<br>• Recitations: 10%<br>• **Physics 266 (click here)**<br><br>Home Page:<br>• http://complex.gmu.edu/www-phys/phys262 |

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Physics 262 is the last of a three-semester calculus based introductory physics sequence for science majors. This course covers a wide range of topics including Thermodynamics, Optics, Special Relativity, and Modern Physics. Together with PHYS 160 and 260, the university physics sequence is designed to give students a working knowledge on the fundamental principles of both classical and modern phyhsics. It also helps you to develop analytical and problem-solving skills which are critical to the learning of every well-educated student.

PHYS 262 together with PHYS 263 fulfills the requirements for **Natural Science with Lab** in the **Mason Core**. The Mason Core is a foundational selection of courses in a student's curriculum that foster the knowledge and skills needed for academic success.

The general education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making. Specically, to achieve these goals, students will aim toward the following Learning Outcomes:

1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
    a. evolves based on new evidence
    b. differs from personal and cultural beliefs
2. Recognize the scope and limits of science.
3. Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
4. Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).

5. [PHYS 263 | lab component] Participate in scientific inquiry and communicate the elements of the process, including:
    a. Making careful and systematic observations
    b. Developing and testing a hypothesis
    c. Analyzing evidence
    d. Interpreting results

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**General Class Policy (Please read this section thoroughly.)**

**Honor Code**: It is expected that students adhere to the George Mason University Honor Code as it relates to integrity regarding coursework and grades. The Honor Code reads as follows: **To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this: Student members of the George Mason University community pledge not to cheat, plagiarize, steal and/or lie in matters related to academic work.** More information about the Honor Code, including definitions of cheating, lying, and plagiarism, can be found at the Office of Academic Integrity website at http://oai.gmu.edu.

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**Recitations**

You MUST attend all your recitations. 10% of your grade will be evaluated on your participation during recitations.

Recitations are scheduled for every week on the following dates and your first recitation section will start in the **frist** week of classes. Your recitation instructor is Prof. Higginbotham (khigginb at gmu dot edu). You need to sign up for either one of the following sections:

- Section 306 : F 12:30p-1:20p
- Section 307 : F 1:30p-2:20p
- Section 308 : F 2:30p-3:20p

The first assignment is a simple tutorial helping you to learn to use the Mastering Physics Website. Althought this exercise will not be counted toward your grade, you need to get yourself familiar with Matering Physics starting in the second week of class.

Homework assignments are 10% of your total Grade. You are encouraged to work on your homework assignments together in small groups but copying homeworks from each others is not allowed. Late homeworks will not be accepted except with VALID medical excuse.

Rectation attendance/performance is 10% of your total Grade.

Tutoring Information: College of Science Tutoring Center, Planetary Hall Basement Room 2
Time: Please check with the Department of Physics' front office in Planetary 203

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**Examination Policy**

The two exams will typically have 4 problems (or questions). Calculators will be needed for quantitative problems. Materials covered in these two exams will be as follows: (Exam #1 - Ch. 17-20; Exam #2 - Ch. 33-36) but be advised that physical concepts from a later chapter might depend on knowledge from previous chapters. For each exam, one problem with the lowest points will be dropped.

The final exam will have 4 or 5 problems (or questions). Calculators will be needed for quantitative problems. The final exam will be COMPREHENSIVE with additional materials from the remaining chapters 37-41. Similar to the other two exams, one problem with the lowest points will be dropped..

Although every effort will be made to adhere to the examination schedule given in the syllabus, the instructor reserves the right to alter the examination schedule during the semester as the necessity arises. If the examination date falls on an unexpected school closing date due to weather or other events, the examination will be postponed to the next regularly scheduled class meeting.

It is the responsibility of each student to attend classes during scheduled examinations as listed in the syllabus regardless of work or family considerations. Made-up exams will be given only to students with VALID medical excuse and they should contact the instructor as soon as they return to school.

THERE ARE NO DROP OPTIONS FOR EXAMS. All exams (two midterms and one final) will be counted toward your final grade.

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 993-2474. All academic accommodations must be arranged through the DRC.

## Physics 262 Syllabus

Back to PHYS 262 Main Page
Click here for Physics 266 info

**Please read the assigned sections of the book before each lecture**

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| * | **Jan. 17** M | MLK Day |
| 1 | **Jan. 25** Tu | **Ch. 17**:17.1-17.4 |
| 2 | **Jan. 27** Th | **Ch. 17**:17.5-17.7 |
| * | **Jan. 31** M (EOB) | **Last day to add** |
| 3 | **Feb. 1** Tu | **Ch. 18**:18.1-18.4 |
| 4 | **Feb. 3** Th | **Ch. 18**:18.5-18.6 and **Ch. 19**:19.1 |
| 5 | **Feb. 8** Tu | **Ch. 19**:19.2-19.5 |
| 6 | **Feb. 10** Th | **Ch. 19**:19.6-19.8 and **Ch. 20**:20.1 |
| 7 | **Feb. 15** Tu | **Ch. 20**:20.2-20.5 |
| * | **Feb. 14** M (EOB) | **Last Day to Drop (50% Refund)** |
| 8 | **Feb. 17** Th | **Ch. 20**:20.6-20.8 |
| 9 | **Feb. 22** Tu | **Ch. 33**:33.1-33.2 |
| 10 | **Feb. 24** Th | **Exam #1 (Ch.17 - Ch. 20)** |
| 11 | **Mar. 1** Tu | **Ch. 33**:33.3-33.5 |
| 12 | **Mar. 3** Th | **Ch. 33**:33.5-33.7 and **Ch. 34**:34.1-34.2 |
| * | **Mar. 7** M | **Midterm reporting available** |
| 13 | **Mar. 8** Tu | **Ch. 34**:34.2-34.3 |
| 14 | **Mar. 10** Th | **Ch. 34**:34.4-34.8 (Optical Instruments will only be covered briefly in lecture.) |
| * | **Mar. 14 - 20** | Spring Break |
| 15 | **Mar. 22** Tu | **Ch. 35**:35.1-35.2 |
| 16 | **Mar. 24** Th | **Ch. 35**:35.3-35.5 |
| 17 | **Mar. 29** Tu | **Ch. 36**:36.1-36.4 |
| 18 | **Mar. 31** Th | **Ch. 36**:36.5-36.8 |

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| 19 | **Apr. 5** Tu | **Ch. 37**:37.1-37.2 |
| 20 | **Apr. 7** Th | **Exam #2 (Ch. 33 - Ch.36)** |
| * | **Note** | A very good book on the physics of spacetime by Brian Green, a physics professor from Columbia University is *The Fabric of the Cosmos: Space, Time, and the Texture of Reality* (Alfred A. Knopf, Inc., 2005). This is a very enjoyable supplemental reading taking you beyond what we are covering in class. |
| 21 | **Apr. 12** Tu | **Ch. 37**:37.3-37.4 |
| 22 | **Apr. 14** Th | **Ch. 37**:37.5-37.7 |
| 23 | **Apr. 19** Tu | **Ch. 37**:37.7-37.9 |
| 24 | **Apr. 21** Th | **Ch. 38**:38.1-38.3 |
| 25 | **Apr. 26** Tu | **Ch. 38**:38.4 and **Ch. 39**>39.1-39.3 |
| * | **Note** | A very readable book on the frontier of modern physics by one of our GMU physics faculty is available: **Robert Oerter**, *The Theory of Almost Everything: The Standard Model, the Unsung Triumph of Modern Physics* (Pi Press, 2005). This is a good supplemental reading if you want to learn more about quarks, QED, Feynman diagrams, and strings. |
| * | **Note** | For the remaining three classes, we will go through Chapters 40-41 with less details. It is meant to be an overview on some special topics in modern physics. |
| 26 | **Apr. 28** Th | **Ch. 39**:39.3-39.5 |
| 27 | **May 3** Tu | **Ch. 39**:39.5-39.6 and **Ch. 40**:40.1 |
| 28 | **May 5** Th | **Ch. 40**:40.2-40.5 and **Ch. 41**:41.1- 41.6 |
| 29 | **May 10** Tu | **Tenative Review day** |
| 30 | **May 12** Th | **Final Exam (7:30a-10:15a)** |

## Physics 262 Assignments

### Grading

Homework assignments are 10% of your total Grade.

Homeworks assignments are assigned through an automated web-based system (Mastering Physics) and they are due on Friday at 11:59pm.

You are encouraged to work on your homework assignments together in small groups but copying homeworks from each others is not allowed.

Honor Codes apply to all proper conducts

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### Mastering Physics

All assignments are electronic. As an integral part of your course, you need to have access to this automated web-based physics homework system: Mastering Physics from Pearson. If you have purchased the text from the university bookstore, you should have Mastering Physics included already. If you have purchased your text book without Mastering Physics, you can purchase the online access key from the Mastering Physics site. All students must use Mastering Physics for their homework assignments.

To enroll correctly in Mastering Physics, please adhere to the following instruction:

- Please use the correct Course ID: **so07609** for your course and following the instruction on the Mastering Physics website.
- For proper crediting of your assignments, please register onto the system using your first name and last name as they appear in Patriot Web.
- Please use your G number for the "Student ID" field.

All assignements are due on Friday 11:59pm.

The first assignment is a tutorial in using Mastering Physics. To get yourself familiar with MP, you should complete this homework assignment by the end of the first week of class.

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# Here to the Mastering Physics site.

## Physics 262 Exams

**All exams will be on campus in person (Innovation Hall 105)**

1. Exam #1 (February 24, Thursday 9:00a-10:15a) - 25% of your total grade
2. Exam #2 (April 7, Thursday 9:00a-10:15a) - 25% of your total grade
3. Final (May 12, Thursday 7:00a-10:15p) - 30% of your total grade

**Equation Tables for Exams:** will be given here table1 | table2 | table3
**Old Sample Exams:** Exam1 | Exam2 | Exam3

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**Examination Policy**

The two midterms will typically have 5 problems (or questions). Calculators will be needed for quantitative problems. Materials covered in these three exams will be as follows: (Exam #1 - Ch. 17-20; Exam #2 - Ch. 33-36) but be advised that physical concepts from a later chapter might depend on knowledge from previous chapters. For each exam, one problem with the lowest points will be dropped..

The final exam will have 6 or 7 problems (or questions). Calculators will be needed for quantitative problems. The final exam will be COMPREHENSIVE with additional materials from the remaining chapters 37-42. Similar to the other three exams, one problem with the lowest points will be dropped..

Although every effort will be made to adhere to the examination schedule given in the syllabus, the instructor reserves the right to alter the examination schedule during the semester as the necessity arises. If the examination date falls on an unexpected school closing date due to weather or other events, the examination will be postponed to the next regularly scheduled class meeting.

It is the responsibility of each student to attend classes during scheduled examinations as listed in the syllabus regardless of work or family

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considerations. Made-up exams will be given only to students with VALID medical excuse and they should contact the instructor as soon as they return to school.

THERE ARE NO DROP OPTIONS FOR EXAMS. All exams (two midterms and one final) will be counted toward your final grade.

Honor Codes apply to proper conducts To get full credits for your solutions:

- Show ALL steps in arriving at the answer - It helps you to think about the problems and it helps me to give you partial credits.
- Give units (cm,sec,N,etc.) in your answers and keep track of the number of significant figures.

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Solutions and Distributions of Exam Grades will be posted below.

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