

Physics 324, “Modern Physics” Syllabus – Spring 2019

General Information

Instructor: Mark Henriksen
Office: Physics 414
Location: Sondheim 409
Time: MWF 10-10:50

email: henrikse@umbc.edu
office hours: MWF 10:50 – 11:30

Goals for this course

This course will give you a broad introduction to most of the modern research areas in physics. If you go on to graduate school at a major research university, there will be substantial research opportunities in the areas covered in this course. Because of the breadth of this course, you will need to do a lot of reading since approximately 20 pages of the book are covered in each lecture. The lectures will emphasize the most important concepts so there will be some topics in the book that are not covered in class. *One of the desired outcomes for this course is that you find a topic or two that you would like to know more about* and take an elective course at UMBC in that area. The UMBC physics department offers undergraduate elective courses in astrophysics and solid state physics with other courses such as relativity and nuclear, “on demand”. Some of the other topics in this course serve as an introduction to future courses: quantum mechanics and statistical physics, which are required of a physics major. In the past, UMBC students have also gone on to get PhDs in particle physics, with no introduction to the field other than that in modern physics. So, it is certainly possible and you can learn a lot of interesting things about such fields in modern physics. Keep in mind that this may be the only class you have in special relativity so remember to give it adequate attention.

Grading procedures

Grades will be calculated using the following template: (1) attendance and class participation – 10%, (2) two midterms – 40%, (3) homework – 20%, (4) final exam – 30%. Please note that exams will be based on lecture material so that good attendance and attention in class is required to do well.

Scope of this Course

The following topics will be covered, in order, during lectures. The lecture material is taken from the textbook, "Modern Physics", by Tipler. You are encouraged to ask questions to further your understanding. You are also encouraged to read related material in the book and anything that interests you.

Schedule

1. P.4 – 55, Special Relativity
2. P. 65 – 112, Special Relativity Continued and Introduction to General Relativity
3. P. 119 – 144, Quantization of Charge, Light and Energy
4. P. 153 - 184, The Nuclear Atom
5. P. 193 – 313, An Introduction to Quantum Mechanics (chapters 5,6,7)
6. Midterm: Review, Exam, Review Exam (chapters 1 – 5)
7. P. 326 - 365, Introduction to Statistical Physics
8. P. 375 – 420, Molecules (**optional**)
9. P. 427 – 484, Introduction to Solid State Physics (**optional** as it is covered elsewhere)
10. P. 494 - 568, Introduction to Nuclear Physics
11. P. 579 - 631, Introduction Particle Physics
12. Midterm II: Review, Exam, Review Exam (chapters 6,7,8,11,12)
13. P. 639 - 696, Concepts in Astrophysics and Cosmology
14. Review for Final Exam

Meeting with Me

Set an appointment in class or via email. The best times to meet, for now, are: MWF 11 AM.

Schedule of Exams

Midterm I: March 13

Midterm 2: May 8

Final Exam: May 20, 10:30-12:30

Homework assignments

Homework is assigned on Monday and is due the following Monday, beginning 1-29-18

1. Ch. 1: 3,13,50,58
2. Ch. 2: 13,17,19,25
3. Ch. 3: 5,21,32,51
4. Ch. 4: 9,13,47,55
5. Ch. 5: 9,13,17,25,33

Midterm I

6. Ch. 6: 9,30,55,47
7. Ch. 7: 26,30,47,63
8. Ch. 8: 13,17,21,41
9. Ch. 11: 17,37,53,99
10. Ch. 12: 1,13,46,51

Midterm II

11. Ch. 13: 13:1,2,5,10,14,28,36,41

Achieving Course Goals and Meeting Academic Expectations

The most successful students in this course attend all classes and take notes. They are attentive and ask questions, occasionally. They complete all homework assignments on time. They review for exams. Most importantly, they either begin the course with adequate preparation or they fill in their missing background, as needed.

Policy on Academic Integrity

“Academic integrity is an important value at UMBC. By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC’s scholarly community in which everyone’s academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic

dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.”

Student Support /Disability Services

“UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA) of 1990, the ADAAA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow for students to have equal access and inclusion in all courses, programs, and activities at the University.”