

Physics 324: Modern Physics – Mark Henriksen

Goals for this course

This course will give you a broad introduction to most of the classical 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. 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 topics in this 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 with in particle physics, with no introduction to the field other than that 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

There will be two midterms and a final exam. In addition to the exams, there will be graded homework each week. Each midterm will count 20%, as will the homework. The final will count 40%.

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
6. Midterm: Review, Exam, Review Exam
7. P. 326 - 365, Introduction to Statistical Physics
8. P. 375 – 420, Molecules

9. P. 427 – 484, Introduction to Solid State Physics (may be 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
13. P. 639 - 696, Concepts in Astrophysics and Cosmology
14. Review for Final Exam