

Physics 324, “Modern Physics” Syllabus – Fall 2023

General Information

Campus name: Marius G. Henriksen

Instructor: Professor Henriksen

Office: Physics 414

Location: Sherman 011

Time: MWF 10 - 10:50 AM

email: henrikse@umbc.edu

office hours: after class or by appointment

Course Communications

Course notices will be posted on blackboard or sent via email to the address in your class registration. You will need to regularly check these locations for important communications regarding this course. Grades are also posted on blackboard.

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 so you can pursue your interests through electives. Some of the other topics in this course serve as an introduction to future physics 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. Also, keep in mind that this may be the only class you have in special relativity, so it is emphasized in class and on exams.

Grading procedures

Grades will be calculated using the following template: (1) two midterm exams worth 25% each, (2) homework worth 25%, and (3) a final exam worth 25%. Please note that exams will be based on lecture material so that good attendance and attention in class will help you do well.

Homework

Please turn in a paper copy of your homework so that I can mark on it while grading. Homework is due according to the schedule below. Late homework may not receive full credit. But if you have a problem getting one in on time, let's talk about it.

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. The homework problem numbers are from the 6th edition. You can use an earlier edition but *must turn in the correct home problems*. Used copies of the 6th edition are available as well as PDF copies on the internet.

Reading Schedule for Lectures and Class Preparation

I will post detailed lecture view graphs for each week's lectures on Blackboard. You can look at these before class because they will provide content for discussion in class.

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. P. 326 - 365, Introduction to Statistical Physics
7. P. 494 - 568, Introduction to Nuclear Physics
8. P. 579 - 631, Introduction Particle Physics
9. P. 639 - 696, Concepts in Astrophysics and Cosmology

Schedule of Exams

Midterm I: October 11

Midterm 2: November 22

Final Exam: December 18th: 10:30 AM – 12:30 PM

Note: Bring a calculator to each exam

Dues dates for homework assignments and exam review dates

Below is the schedule of homework with **due dates in parentheses**

1. Ch. 1: 3,13,50,58 (9/11)
2. Ch. 2: 13,17,19,25 (9/18)
3. Ch. 3: 5,21,32,51 (9/25)
4. Ch. 4: 9,13,47,55 (10/2)
5. Ch. 5: 9,13,17,25,33 (10/9)

Midterm I: Review on 10/9 (**Chapters 1 – 5**), Exam on 10/11

6. Ch. 6: 9,30,55,47 (10/23)
7. Ch. 7: 26,30,47,63 (10/30)
8. Ch. 8: 13,17,21,41(11/6)
9. Ch. 11: 17,37,53,99 (11/13)
10. Ch. 12: 1,13,46,51(11/20)

Midterm II: Review on 11/20 (chapters 6,7,8,11,12), Exam on 11/22

1. Ch. 13:1,2,5,10,14,28,36,41 (12/11) **Note that this is a Friday (6 lectures on Chapter 13)**

Final exam: Review 12/11 (chapters 1 – 5), Exam on 12/18 10:30 AM – 12:30 PM

Achieving Course Goals and Meeting Academic Expectations

Attending class, completing all homework assignments, and completing any test preparation assignments will help you do well in the course.

Note: The following content is created by others and mandated to be on all syllabi.

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.”

Accessibility and Disability Accommodations, Guidance and Resources (required)

Accommodations for students with disabilities are provided for all students with a qualified disability under the Americans with Disabilities Act (ADA & ADAAA) 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 creates equal access for students when barriers to participation exist in University courses, programs, or activities.

If you have a documented disability and need to request academic accommodations in your courses, please refer to the SDS website at sds.umbc.edu for registration information and office procedures.

SDS email: disAbility@umbc.edu

SDS phone: [410-455-2459](tel:410-455-2459)

If you will be using SDS approved accommodations in this class, please contact the instructor to discuss implementation of the accommodations. During remote instruction requirements due to COVID, communication and flexibility will be essential for success.

Sexual Assault, Sexual Harassment, and Gender Based Violence and Discrimination (required)

[UMBC Policy](#) in addition to federal and state law (to include Title IX) prohibits discrimination and harassment on the basis of sex, sexual orientation, and gender identity in University programs and activities. Any student who is impacted by sexual harassment, sexual assault, domestic violence, dating violence, stalking, sexual exploitation, gender discrimination, pregnancy discrimination, gender-based harassment, or related retaliation should contact the University’s Title IX Coordinator to make a report and/or access support and resources. The Title IX Coordinator can be reached at titleixcoordinator@umbc.edu or 410-455-1717.

You can access support and resources even if you do not want to take any further action. You will not be forced to file a formal complaint or police report. Please be aware that the University may take action on its own if essential to protect the safety of the community.

If you are interested in making a report, please use the [Online Reporting/Referral Form](#). Please note that, if you report anonymously, the University’s ability to respond will be limited.

Notice that Faculty and Teaching Assistants are Responsible Employees with Mandatory Reporting Obligations

All faculty members and teaching assistants are considered Responsible Employees, per UMBC's [Policy on Sexual Misconduct, Sexual Harassment, and Gender Discrimination](#). Faculty and teaching assistants therefore required to report all known information regarding alleged conduct that may be a violation of the Policy to the Title IX Coordinator, even if a student discloses an experience that occurred before attending UMBC and/or an incident that only involves people not affiliated with UMBC. Reports are required regardless of the amount of detail provided and even in instances where support has already been offered or received.

While faculty members want to encourage you to share information related to your life experiences through discussion and written work, students should understand that faculty are required to report past and present sexual harassment, sexual assault, domestic and dating violence, stalking, and gender discrimination that is shared with them to the Title IX Coordinator so that the University can inform students of their [rights, resources, and support](#). While you are encouraged to do so, you are not obligated to respond to outreach conducted as a result of a report to the Title IX Coordinator.

If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, UMBC has a number of [Confidential Resources](#) available to support you:

[Retriever Integrated Health](#) (Main Campus): 410-455-2472; Monday – Friday 8:30 a.m. – 5 p.m.; For After-Hours Support, Call 988.

[Center for Counseling and Well-Being](#) (Shady Grove Campus): 301-738-6273; Monday-Thursday 10:00a.m. – 7:00 p.m. and Friday 10:00 a.m. – 2:00 p.m. (virtual) [Online Appointment Request Form](#)

Pastoral Counseling via [The Gathering Space for Spiritual Well-Being](#): 410-455-6795; i3b@umbc.edu; Monday – Friday 8:00 a.m. – 10:00 p.m.

Other Resources

[Women's Center](#) (open to students of all genders): 410-455-2714; womenscenter@umbc.edu; Monday – Thursday 9:30 a.m. – 5:00 p.m. and Friday 10:00 a.m. – 4 p.m.

[Shady Grove Student Resources](#), [Maryland Resources](#), [National Resources](#).

Child Abuse and Neglect

Please note that Maryland law and [UMBC policy](#) require that faculty report all disclosures or suspicions of child abuse or neglect to the Department of Social Services and/or the police even if the person who experienced the abuse or neglect is now over 18.

Pregnant and Parenting Students

UMBC's [Policy on Sexual Misconduct, Sexual Harassment and Gender Discrimination](#) expressly prohibits all forms of discrimination and harassment on the basis of sex, including

pregnancy. Resources for pregnant, parenting and breastfeeding students are available through the University's [Office of Equity and Civil Rights](#). Pregnant and parenting students are encouraged to contact the Title IX Coordinator to discuss plans and ensure ongoing access to their academic program with respect to a leave of absence – returning following leave, or any other accommodation that may be needed related to pregnancy, childbirth, adoption, breastfeeding, and/or the early months of parenting.

In addition, students who are pregnant and have an impairment related to their pregnancy that qualifies as disability under the ADA may be entitled to accommodations through the [Office of Student Disability Services](#).

Religious Observances & Accommodations

UMBC [Policy](#) provides that students should not be penalized because of observances of their religious beliefs, and that students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences or requested modifications for religious observances in advance, and as early as possible. For questions or guidance regarding religious observances and accommodations, please contact the Office of Equity and Civil Rights at ecr@umbc.edu.

Hate, Bias, Discrimination and Harassment

UMBC values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement.

Consistent with these principles, [UMBC Policy](#) prohibits discrimination and harassment in its educational programs and activities or with respect to employment terms and conditions based on race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information.

Students (and faculty and staff) who experience discrimination, harassment, hate, or bias based upon a protected status or who have such matters reported to them should use the [online reporting/referral form](#) to report discrimination, hate, or bias incidents. You may report incidents that happen to you anonymously. Please note that, if you report anonymously, the University's ability to respond may be limited.