

## Syllabus

**Instructor:** Dr. Eileen Meyer

**Office:** Physics Building, 312 (long side of 3rd floor)

**Email:** Dr.Meyer@umbc.edu

**Lectures:** Mondays and Wednesdays 2:00-3:15 in Sherman 006

**Office Hours:** Mon 3:15-4:10 PM, Wed 9-10:30 AM in PHYS 312, or by appointment

*Please make sure to use the address Dr.Meyer@umbc.edu, as this is filtered into a special inbox for this class. If you use another email alias, there may be a delay in responding as I usually get upwards of 100 emails/day during the work week.*

**Textbook:** **George C. King, *Vibrations and Waves*** (required, print or e-book ok)

**Learning Goals and Course Overview:** This course introduces the mathematics and physics of oscillatory and wave phenomena, which occur in a wide array of contexts throughout nature. We will cover damped and forced oscillations, travelling and standing waves, as well as wave interference, diffraction, and dispersion of waves. Applications in optics (electromagnetic waves, polarization, optical devices) will also be discussed, but students desiring more depth should consider taking the elective PHYS 408 (Optics) after this course. Anticipate an interactive learning environment where your participation is expected. Demonstrations, small computer simulations, as well as quantitative and qualitative problem solving will be an integral part of the lectures.

### **Resources:**

- **Blackboard.** This course will rely on blackboard for course announcements and to disseminate weekly homework, solutions, etc. Lecture notes from class as well as live class recordings will also be made available on blackboard.

- **Textbook.** We will rely primarily on the required book “*Vibrations and Waves*” by George C. King, but additional material will be provided through notes, videos, and excerpts from other texts as needed (see blackboard for these postings). ***You are expected to read the book cover to cover for this class. Please budget time for it in your weekly schedule.***

- **Schedule:** Please print out and refer regularly to the course schedule below and posted on blackboard. In particular, *you will be expected to have done the listed reading prior to attending class.*

- **Office Hours.** Office hours are weekly times (see above) where I will be available for questions about course content, points of confusion remaining from lecture, homework, etc. Office hours are most useful when students come in with relatively specific questions or concerns about course content. For fairness/workload reasons, office hours cannot be used to essentially re-teach content that a student has missed in class -- for that I provide recordings of all lectures (videos and PDFs). While I am happy to chat about general

approach or help you trouble-shoot your approach if you are struggling, please note that this is not the primary purpose of office hours -- it will often be more appropriate to make a separate appointment to discuss things with me or your academic advisor where we work to find additional help like the tutorial center, a study group, counseling center, etc as appropriate. Finally, it's perfectly appropriate to ask short or less involved questions to me before/after class if that is more convenient for you than the office hours.

### **GRADING**

Your final letter grade will be determined by a numerical score, calculated as the following percentages. Graded work is returned promptly, so you should always be able to calculate your current standing in the course. While I do use the blackboard gradebook for tracking attendance and posting other grades, the 'free' missed classes and dropped quiz grade (as well as some extra credit) are not applied until the end of the course, so you are encouraged to calculate your grade yourself for the most accurate result.

**Homework (30%)** Homework questions will provide good practice for the types of questions likely to be posed on the mid terms and final exams. A homework will be assigned every week, usually 3-4 problems, and solutions must follow the 'Full and Complete Solution' rubric posted on blackboard (we will go over this in class). Students are expected to solve all the problems of the homework, but to ease the grading workload, only one problem will be randomly selected and graded on the detailed rubric (out of ~ 10 points, usually) while the other problems will be given a simplified 2-point grade: 1 for effort, 1 for arriving at the correct or nearly correct solution. (Effort is largely judged based on following the rubric which requires clear diagrams, words of explanation, no skipped steps, checking your answer, etc.) At the end of the semester the lowest homework grade is dropped. The dates that homeworks are due are given in the course calendar/schedule, and are always due at 5 PM that day.

**Midterm exams (3 total, 10% each):** Each midterm will primarily focus on the new material covered since the previous exam (though in some cases it is inevitable that you will need to remember what you learned earlier in the course). Midterms are in-class unless you have an accommodation letter on file with the office of student disability services ([sds.umbc.edu](http://sds.umbc.edu)). In such cases please note that the student is required to file a request for use of the testing center at least two business days before the exam (and preferably, much earlier). The midterms will be held on Sep 23, Oct 16, and Nov 18 and will take the full class time (2-3:15). The final exam will be on December 13th from 1-3 PM.

**Final Exam (30%)** A two-hour exam at the end of the course on all the course material.

**Participation (10%)** Your participation score is a combination of attendance and active participation in class, as well as regular 'check-in' problems on blackboard.

**Final Grades** The letter grade will be assigned from your total numerical grade as follows:

- A: >90%**
- B: 80-89%**
- C: 70-80%**
- D: 60-69%**
- F: <60%**

Grades are rounded to the nearest whole number, so for example if your final score is 89.54, you will receive an A. Inevitably, some students will score very close to the line for the next grade up. Please note that in the interest of fairness it is not possible to change your grade arbitrarily or to add unearned points to your final grade. There is no curve in this class, but there will be some opportunities (announced in class, with clear guidelines and due dates) for extra credit throughout the semester. Please let me know *in advance* if you cannot participate in any of the exams due to religious or personal or any other reasons.

### **Attendance Policy**

Attendance to class is required. Up to 4 missed classes are allowed without penalty for all students, which is meant to cover typical unanticipated events such as brief periods of illness or car breakdown. This does not include absences due to religious observance or travel for athletes with documentation from their coaches, but these latter absences need to be communicated to the professor well in advance (preferably at semester start), especially if a quiz or exam will be missed. If you experience a major medical event or suffer a newly diagnosed condition (including covid-19) that is likely to disrupt your ability to participate in class, you are encouraged to reach out as soon as possible to the disability support services to receive appropriate accommodations. For reasons of fairness, faculty are not allowed to make exceptions beyond the stated policy outside of the accommodations process. All classes are recorded and posted online for easy review and/or viewing in the event of a missed class.

### **Homework Policy**

Homework due dates are noted in the course schedule at the start of term, you are advised to put reminders into your own schedule or calendar system. **Late work is not accepted** (except where required under a letter of accommodation) and will result in a zero -- if you are running behind, it is better to submit what you have at the deadline and get partial credit. (Among other reasons, this allows us to post the solutions more or less immediately for class review). You are advised to start on the homework as soon as it is posted on blackboard and/or announced in class. Study groups can be helpful and are allowed, as are checking answers with each other, but the written solution needs to be fully your own and copying solutions from the internet or another student is absolutely forbidden (and very bad for your own learning anyway). At the end of the semester, the lowest homework grade is dropped from the final average.

### **Exams**

Exams require in-person participation (either in the classroom or at the testing center for those with accommodations through SDS). Unexcused absences exams will result in a zero.

Allowable excuses include illness, injury, religious observance or serious emergencies, and these should be communicated in advance with documentation where possible/appropriate. Please note, family vacations, weddings, etc do not qualify as excused absences. Make-up exams for excused reasons will be scheduled as close as possible to the in-class exam. Please note that the make-up exam may differ (either all or in part) from the in-class exam

**Academic Integrity:** 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. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, and the UMBC Policies section of the UMBC Directory.

### **Accessibility and Disability Accommodations, Guidance and Resources**

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](https://sds.umbc.edu) for registration information and office procedures.

SDS email: [disAbility@umbc.edu](mailto: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**

[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](mailto: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](mailto: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](mailto: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](mailto: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.

## August 2024

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Topic	Reading
1	25	26	27	28 L1 - first day of class	29	30	31	8/28 Intro; Simple Harmonic Oscil.	1.1-1.2

## September 2024

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Topic	Reading
2	1	2 Labor Day - no class	3	4 L2	5	6	7	9/2: No Class (Labor Day). 9/4: Simple Harmonic Oscil.	1.3-1.4
3	8	9 L3	10	11 L4	12 homework 1 due	13	14	9/9: Simple & Damped Oscillator 9/11: Damped Oscillator	2.1-2.3 2.4
4	15	16 L5	17	18 L6	19 homework 2 due	20	21	9/16: Damped Oscillator 9/18: Exam Review**	
5	22	23 Exam 1	24	25 L7	26	27	28	9/23: Exam 1 (Ch 1-2) 9/25: Complex Num, Forced Osc.	3.1-3.2, Sup. 1

\*\* 9/18 Exam Review will be conducted by substitute; Dr. Meyer away on research travel

## October 2024

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Topic	Reading
6	29	30 L8	1	2 L9	3 homework 3 due	4	5	9/30: Forced Oscillations 10/2: Coupled Oscillations	3.3-3.5 4.1-4.4
7	6 L10	7	8	9 L11	10 homework 4 due	11	12	10/7: Coupled Oscillations 10/9: Transverse Oscillations	4.5 4.6
8	13 L12	14	15	16 Exam 2	17	18	19	10/14: Exam Review 10/16: Exam 2 (Ch 3-4)	
9	20 L13	21	22	23 L14	24	25	26	10/21: Traveling Waves, Wave Eq. 10/23: Wave Energy, Boundaries	5.1-5.4. 5.5-5.7
10	27 L15	28	29 homework 5 due	30 L16	31	1	2	10/28: 2D/3D Waves, EM Waves. 10/30: EM Waves & Polarization	5.8, Sup. 2

## November 2024

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Topic	Reading
11	3 L17	4	5 homework 6 due	6 L18	7	8	9	11/4: Standing Waves 11/6: Normal Modes, Fourier	6.1-6.3 6.4, Sup. 3
12	10 L19	11	12 homework 7 due	13 L20	14	15	16	11/11: Fourier Analysis 11/13: Exam Review	
13	17 L21	18 Exam 3	19	20 L22	21	22	23	11/18: Exam 3 (Ch 5-6+) 11/20: Interference & Diffraction	7.1-7.2
14	24 L22	25	26	27 L23	28 Thanksgiving Break	29	30	11/25: Diffraction, Optical Devices 11/27: Dispersion	8.1-8.3

## December 2024

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Topic	Reading
15	1 L24	2	3 homework 8 due	4 L25	5	6	7	12/2: Dispersion, Wave Packets 12/4: Optics Applications	8.4
16	8 L26	9	10	11	12	13 Final Exam (1--3 pm)	14	12/13: 1st half course review 12/16: Final Exam	
	15		17	18	19	20	21		