

## MA/PHY 506

### Methods of Theoretical Physics I

Semester/Term: Fall 2022

Credit Hours: 3.0

Meeting Days/Time/Location: MWF 12:00-12:50pm, Chemistry-Physics Bldg Rm.287

### Instructor Information

Instructor: Richard Hill

Email: Richard.Hill [at] uky.edu

Office: Blazer Dining, 343 Martin Luther King Blvd., BL353, 859-257-1997

Office Hours: after lecture and online by appointment

### Course Description

The course and its sequel (MA/PHY 507) are designed to develop, for first-year graduate students, familiarity with the mathematical tools useful in physics. Topics include curvilinear coordinates, infinite series, integrating and solving differential equations of physics, and methods of complex variables. Work with Green's functions, eigenvalues, matrices and the calculus of variations are included as a part of MA/PHY 506 and 507.

### Course Prerequisites

PHY 404G or equivalent.

### Recommended Materials

*Matthews and Walker, Mathematical Methods of Physics* (2<sup>nd</sup> Edition)

*Arfken and Weber, Mathematical Methods for Physicists* (7<sup>th</sup> Edition, available online at Science Direct via UK library)

### Technology Information and Requirements

#### Technology Requirements

Minimum technical requirements for UK courses and suggested hardware, software, and internet connections are available at [ITS Student Hardware & Software Guidelines](#).

#### Technical Support

For account help, contact UK's [Information Technology Customer Services online](#), by [email](#), or by phone at 859-218-HELP (4357).

### Activities and Assignments

There will be bi-weekly problem sets (50%), a midterm exam (20%) and a final exam (30%). Homework assignments are an essential part of the course. It is legitimate to discuss problems with other students, consult textbooks or get advice from your instructor. However, the final work must be yours!

#### Course Assignments

- 1 Final exam 30 points
- 1 Midterm exam 20 points

- 5 graded homework assignments at 10 points each (lowest grade of 6 dropped)

## Submission of Assignments

Online via Canvas

## Course Grading

### Expectations for graduate students beyond the expectations for undergraduates

Grading scale for undergraduates	80 – 100% = A
	70 – 79% = B
	60 – 69% = C
	50 – 59% = D
	Below 50% = E

Grading Scale for graduate students (no D for Grad Students)	80 - 100% = A
	70 – 79% = B
	60 – 69% = C
	Below 60%= E

### Mid-term Grade (for 100-400 level courses, and for undergrads in 500-level courses)

Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the [Academic Calendar](#).

## Tentative Course Schedule

Week	Chapter in MW	Topic
1,2	3; Appendix	Complex variables
3,4	1	Ordinary differential equations
5,6	13; 2	Numerical methods; series
7,8	2; 4	Series; integral transforms
9,10	6	Vector spaces; eigenvalue problems
11,12	7	Special functions
13,14	8	Partial differential equations
15,16		Review

## Midterm Exam Information

Monday, October 17, in class

## Final Exam Information

Monday, December 12, 1-3pm

## Academic Policy Statements

See the Academic Policy statements at <https://www.uky.edu/universitysenate/acadpolicy> for information regarding:

- [Excused Absences and Acceptable Excuses](#)
- [Religious Observances](#)

- [Verification of Absences](#)
- [Make-Up Work](#)
- [Excused Absences for Military Duties](#)
- [Unexcused Absences](#)
- [Prep Week and Reading Days](#)
- [Accommodation Due to Disability](#)
- [Non-Discrimination Statement and Title IX Information](#)
- [Regular and Substantive Interactions](#)

### Academic Integrity– Prohibition on Plagiarism (Senate Rules 6.3.1)

See the Academic Offenses Rules for Undergraduate and Graduate Students at <https://www.uky.edu/universitysenate/ao> for information regarding:

- [Plagiarism](#)
- [Cheating](#)
- [Misuse of Academic Records](#)

**Plagiarism:** Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty.

*Senate Rule 6.3.1* states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be, except under specific circumstances (e.g. Writing Center review, peer review) allowed by the Instructor of Record or that person's designee. Plagiarism may also include double submission, self-plagiarism, or unauthorized resubmission of one's own work, as defined by the instructor. Students may discuss assignments among themselves or with an instructor or tutor, except where prohibited by the Instructor of Record (e.g. individual take-home exams). However, the actual work must be done by the student, and the student alone, unless collaboration is allowed by the Instructor of Record (e.g. group projects).

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

**Cheating** is defined by its general usage. It includes, but is not limited to, the wrongfully giving, taking, or presenting any information or material by a student with the intent of aiding himself/herself or another on any academic work which is considered in any way in the determination of the final grade. The fact that a student could not have benefited from an action is not by itself proof that the action does not constitute cheating. Any question of definition shall be referred to the University Appeals Board.

**Misuse of academic records:** Maintaining the integrity, accuracy, and appropriate privacy of student academic records is an essential administrative function of the University and a basic protection of all students. Accordingly, the actual or attempted falsification, theft, misrepresentation or other alteration or misuse of any official academic record of the University, specifically including knowingly having unauthorized access to such records or the unauthorized disclosure of information contained in such records, is a serious academic offense. As used in this context, "academic record" includes all paper and electronic versions of the partial or complete permanent academic record, all official and unofficial academic transcripts, application documents and admission credentials, and all academic record transaction documents. The minimum sanction for falsification, including the omission of information, or attempted falsification or other misuse of academic records as described in this section is suspension for one semester.

## Course Recordings

The University of Kentucky [Code of Student Conduct](#) defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.

Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Code of Student Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an “authorization of use” form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

### Course Copyright

All original instructor-provided content for this course, which may include handouts, assignments, and lectures, is the intellectual property of the instructor(s). Students enrolled in the course this academic term may use the original instructor-provided content for their learning and completion of course requirements this term, but such content must not be reproduced or sold. Students enrolled in the course this academic term are hereby granted permission to use original instructor-provided content for reasonable educational and professional purposes extending beyond this course and term, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship; other uses of original instructor-provided content require written permission from the instructor(s) in advance.

### Resources

See <https://www.uky.edu/universitysenate/student-resources> for Resources Available to Students:

- [Bias Incident Support Services](#)
- [Computer Labs and Technical Support](#)
- [Counseling Center](#)
- [Disability Resource Center](#)
- [Libraries](#)
- [Martin Luther King Center](#)
- [Non-Discrimination / Title IX](#)
- [Office of LGBTQ\\* Resources](#)
- [Veterans Resource Center](#)
- [Violence Intervention and Prevention \(VIP\) Center](#)

### Diversity, Equity and Inclusion

See <https://www.uky.edu/universitysenate/syllabus-dei>