

MA/PHY 507

Methods of Theoretical Physics II

Semester/Term: Spring 2021

Credit Hours: 3.0

Meeting Days/Time/Location: Online, MW 2:30-3:45pm

Instructor Information

Instructor: Richard Hill

Email: Richard.Hill [at] uky.edu

Virtual Office Hours: MW after lecture or by appointment

Course Description

The course and its prequel (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

Mathews and Walker, Mathematical Methods of Physics (2nd Edition)

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

Technology Information and Requirements

Technology Requirements

Lectures and office hours to be held using zoom.

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 70%= 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](#).

Resources

[Distance Learning Library Services](#)

[Carla Cantagallo](#), Distance Learning Librarian, 859-218-1240

Tentative Course Schedule

Week	Chapter in MW	Topic
1,2	8	Partial differential equations and integral transforms
3,4	9,10	Green's functions and perturbation theory
5,6	11	Integral equations
7,8	12	Variational problems
9		Midterm
10,11	14	Probability and statistics
12,13	15	Differential geometry
14,15	16	Group theory

Midterm Exam Information

Monday, March 22, 2:30-3:30pm, Online

Final Exam Information

Wednesday, December 2, 1-3pm, Online

Attendance Policy

Attendance and participation in online lectures are expected.

Senate Rules 5.2.5.2.1 defines the following as acceptable reasons for excused absences: 1. significant illness; 2. death of a family member; 3. trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events; 4. major religious holidays; 5. interviews for graduate/professional school or full-time employment post-graduation; and 6. other circumstances found to fit “reasonable cause for nonattendance” by the instructor of record. Students should notify the professor of absences prior to class when possible.

If a course syllabus requires specific interactions (e.g., with the instructor or other students), in situations where a student’s total EXCUSED absences exceed 1/5 (or 20%) of the required interactions for the course, the student shall have the right to request and receive a "W," or the Instructor of Record may award an "I" for the course if the student declines a "W." (Senate Rules 5.2.5.2.3.1)

Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.5.2.1* states that faculty have the right to request appropriate verification when students claim an excused absence due to: significant illness; death in the household, trips for classes, trips sponsored by an educational unit and trips for participation related to intercollegiate athletic events; and interviews for full-time job opportunities after graduation and interviews for graduate and professional school. (Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.)

Programs with learning activities mandated by accreditation or licensure agencies may establish, as a matter of policy, educational consequences for students who have so many excused absences that they cannot complete the mandated learning activities. Pursuant to Senate Rules 6.1.1, the published program policies and individual course syllabi must describe these consequences, which may include the student being moved to a different graduation cohort.

Excused Absences (Senate Rules 5.2.5.2.1)

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Verification of Absences (Senate Rules 5.2.5.2.1)

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Religious Observances (Senate Rules 5.2.5.2.1(4))

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays. Please check the course syllabus for the notification requirement. If no requirement is specified, two weeks prior to the absence is reasonable and should not be given any later. Information regarding major religious holidays may be obtained through [the Ombud's website](#) or calling 859-257-3737.

Make-Up Work (Senate Rule 5.2.5.2.2)

Except where prior notification is required, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence; and for making up the missed work. The instructor must give the student an opportunity to make up the work and/or the exams missed due to the excused absence, and shall do so, if feasible, during the semester in which the absence occurred. The instructor shall provide the student with an opportunity to make up the graded work and may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

For students who add a class after the first day of classes and miss graded work, the instructor shall provide the student with an opportunity to make up the graded work (quiz, exam, homework, etc.). The instructor may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

Excused Absences and W/I, All Students (Senate Rule 5.2.5.2.3.1)

If a student has excused absences for more than one-fifth of the required interactions for a course, the student can request a "W." If the student declines a "W," the Instructor of Record may award an "I" for the course

Excused Absences Due to Military Duties (Senate Rule 5.2.5.2.3.2)

If a student must be absent for one-fifth or less of the required course interactions (e.g., class meetings) due to military duties, the following procedure apply:

1. Once a student is aware of a call to duty, the student shall provide a copy of the military orders to the Director of the Veterans Resource Center. The student shall also provide the Director with a list of her/his courses and instructors.
2. The Director will verify the orders with the appropriate military authority and on behalf of the military student, notify each Instructor of Record via Department Letterhead as to the known extent of the absence.
3. The Instructor of Record shall not penalize the student's absence in any way and shall provide accommodations and timeframes so that the student can make up missed assignments, quizzes, and tests in a mutually agreed upon manner.

Accommodations Due to Disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. Visit the [DRC website](#), [email the DRC](#), contact them by phone at (859) 257-2754, or visit their office on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407.

Non-Discrimination Statement and Title IX Information

UK is committed to providing a safe learning, living, and working environment for all members of the University community. The University maintains a comprehensive program which protects all members from discrimination, harassment, and sexual misconduct. For complete information about UK's prohibition on discrimination and harassment on aspects such as race, color, ethnic origin, national origin, creed, religion, political belief, sex, and sexual orientation, please see [the electronic version of UK's Administrative Regulation 6:1 \("Policy on Discrimination and Harassment"\)](#). In accordance with Title IX of the Education Amendments of 1972, the University prohibits discrimination and harassment on the basis of sex in academics, employment, and all of its programs and activities. Sexual misconduct is a form of sexual harassment in which one act is severe enough to create a hostile environment based on sex and is prohibited between members of the University community and shall not be tolerated. For more details, please see [the electronic version of Administrative Regulations 6:2 \("Policy and Procedures for Addressing and Resolving Allegations of Sexual Assault, Stalking, Dating Violence, Domestic Violence, and Sexual Exploitation"\)](#). Complaints regarding violations of University policies on discrimination, harassment, and sexual misconduct are handled by the Office of Institutional Equity and Equal Opportunity (IEEO), which is located in 13 Main Building and can be reached by phone at (859) 257-8927. You can also visit [the IEEO's website](#).

Faculty members are obligated to forward any report made by a student related to IEEO matters to the Office of Institutional Equity and Equal Opportunity. Students can *confidentially* report alleged incidences through the Violence Intervention and Prevention Center, Counseling Center, or University Health Services.

Academic Integrity– Prohibition on Plagiarism (Senate Rules 6.3.1)

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. 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.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the [Code of Student Rights and Responsibilities](#). Complete information can be found on the [Academic Ombud](#) page. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rule 6.3.1 (see current [Senate Rules](#)) 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 or 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.

Academic Integrity - Prohibition on Cheating (Senate Rules 6.3.2)

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.

Academic Integrity - Prohibition on Falsification/Misuse of Academic Records (SR 6.3.3)

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 Material Copyright Statement

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.

All content for this course, including handouts, assignments, and lectures are the intellectual property of the instructors and cannot be reproduced or sold without prior permission from the instructors. A student may use the material for reasonable educational and professional purposes extending beyond this class, 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.

Bias Incident Support Services

Bias Incident Support Services (BISS) provides confidential support and advocacy for any student, staff, or faculty member impacted by bias, hatred, and/or an act of identity-based violence. BISS staff aid impacted parties in accessing campus and community resources, including the Bias Incident Response Team, the University's official reporting system for acts that negatively impact a sense of belonging. Campus and community consultation and educational opportunities centered on inclusion, diversity, equity and belonging is a resource also provided by BISS. For more detailed information please visit the [BISS website](#) or contact them [via email](#).

Counseling Center

The UK Counseling Center (UKCC) provides a range of confidential psychological services to students enrolled in 6 credit hours or more, psychoeducational outreach programming (including QPR suicide prevention), and consultation to members of the UK community (students, faculty, staff, administrators, parents, concerned others). Please visit the website <https://www.uky.edu/counselingcenter/> for more detailed information, or call 859.257.8701.

Martin Luther King Center

The Martin Luther King Center (MLKC) supports an inclusive learning environment where diversity and individual differences are understood, respected, and appreciated as a source of strength. The MLKC's year-round programs and activities that focus on the importance of cultural awareness and cross-cultural understanding support its three primary goals: 1) sponsoring cultural and educational programming; 2) offering opportunities for student support and development; and 3) through programmatic linkages with a wide variety of civic and community agencies, promoting community outreach, engagement, and collaboration. Students can reach the MLKC via phone at (859) 257-4130, by visiting them in Gatton Student Center Suite A230, [via email](#), and by visiting [the MLKC website](#).

Office of LGBTQ* Resources

UK is committed to supporting students and upholding the University's efforts to promote inclusion among our community. UK faculty and staff employees support inclusion and diversity throughout the University, including the ways in which faculty structure classroom conversations and manage those dynamics. To assist in these efforts, students are welcome to provide the names and pronouns they prefer. One easy way to do this is by using the pronoun feature of UK's Name Change Form. (More information about the form can be found on the [Office of LGBTQ*s website](#).) Otherwise, students can provide this information to faculty members directly.

Discrimination based on sexual orientation, gender expression, and gender identity is prohibited at UK. If you have questions about support, advocacy, and community-building services related to sexual orientation, gender expression, or gender identity, students are encouraged to visit the [website of the Office of LGBTQ* Resources](#).

Veteran's Resource Center & Protocol for Short-Term Military Absences

Being both a member of the military community and a student can bring some complexities. If you are a member of the military or a military veteran or dependent, please let me know when these challenges arise. Drill schedules, calls to active duty, mandatory training exercises, issues with GI Bill disbursement, etc. can complicate your academic life. Let me know if you experience complications and I will do my best to work with you.

The Veteran's Resource Center (VRC) is a great resource for members of our military family. If you have questions regarding your VA benefits or other related issues, the VRC has a full complement of staff to assist you. The VRC also provides study and lounge space, as well as free printing. Please visit the [VRC website](#), [email the VRC](#), visit them in the basement of Erikson Hall, or call the director, Colonel Tony Dotson, at (859) 257-1148.

If you are a military student serving in the National Guard or Reserve, it is in your best interest to let all of your professors know that immediately. You might also consider sharing a copy of your training schedule.

If you are a military student who is a member of the National Guard or Military Reserve and are called to duty for one-fifth or less of this semester, please help me help you! Once you become aware of the call to duty, provide a copy of your military orders to the Director of the Veterans Resource Center (contact information above). (Please also provide the Director with a list of all your current courses and instructors.) The Director will verify the orders with the appropriate military authority and on your behalf will notify me and your other instructors as to the known extent of the absence.

I will not penalize your absence in any way and will work with you to create reasonable accommodations for making up missed assignments, quizzes, and tests.

Violence Intervention and Prevention (VIP) Center

If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, you can visit the [Violence Intervention and Prevention \(VIP\) Center's website](#) (offices located in Frazee Hall, lower level; [email them](#); or call (859) 257-3574), [the Counseling Center's \(CC\) website](#) (106 Frazee Hall; (859)), and the [University Health Services \(UHS\) website](#); the VIP Center, CC, and UHS are confidential resources on campus. **The VIP Center accepts walk-in appointments.**