

## Course Change Request

### New Course Proposal

Date Submitted: 05/08/19 12:51 pm

Viewing: **PHYS 683 : Mathematical Methods in Physics**

Last edit: 05/08/19 12:51 pm

Changes proposed by: jrosenb4

Are you completing this form on someone else's behalf?

No

Effective Term: Spring 2020

Subject Code: PHYS - Physics

Course Number: 683

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Mathematical Methods in Physics

Banner Title: Math Methods in Physics

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May only be taken once for credit (NR)  
\*GRADUATE ONLY\*

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s): Undergraduate degree in physics or permission of instructor.

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

#### In Workflow

1. **PHYS GR Committee**
2. **PHYS Chair**
3. **SC Curriculum Committee**
4. SC Associate Dean
5. Assoc Provost-Graduate
6. Registrar-Courses
7. Banner

#### Approval Path

1. 05/08/19 2:14 pm  
Robert Weigel (rweigel): Approved for PHYS GR Committee
2. 05/08/19 3:51 pm  
Paul So (paso): Approved for PHYS Chair

**Field(s) of Study:****Class(es):****Level(s):** Include**Degree(s):** Exclude**School(s):**

**Catalog Description:** Covers common mathematical methods used in physics. Topics include vector and variational calculus; functions of complex variables; integral and discrete transforms; ordinary and partial differential equations; special functions; and linear operators and matrices.

**Justification:** Students entering graduate-level physics courses sometimes struggle to connect their mathematical knowledge to the physical principles in these courses. This new course is designed to prepare students for the mathematical rigor of graduate-level physics courses and to help them to make the connections between the mathematics and the physics.

**Does this course cover material which crosses into another department?** No

**Learning Outcomes:**

**Attach Syllabus** [PHYS 683 Syllabus.pdf](#)

**Additional Attachments**

**Staffing:** All physics department faculty are qualified to teach this course.

**Relationship to Existing Programs:** Although this course covers mathematical topics, it is a standard course offered by Physics PhD programs.

**Relationship to Existing Courses:** This course should be taken by graduate students in their first semester, and is a 600-level course number that will allow advanced undergraduate students to enroll. The course is designed to prepare students for the mathematical rigor of graduate-level physics courses and to help them make the connections between the mathematics and the physical principles.

**Additional Comments:****Reviewer Comments**

Key: 15837

# **Syllabus for PHYS 683**

## **Mathematical Methods in Physics**

### **Contact Information**

- Day(s) and Time:
- Location:
- Instructor:
- Email:
- Phone:
- Office Hour:
- Office:

### **Course Objectives**

Students will master essential mathematical methods used in graduate-level physics courses.

### **Schedule**

Week 1: linear operators and matrices

Week 2: vector analysis & tensors

Week 3: functions of complex variables

Week 4: functions of complex variables

Week 5: functions of complex variables

Week 6: ordinary and partial differential equations

Week 7: ordinary and partial differential equations

Week 8: Sturm-Liouville Theory

Week 9: special functions

Week 10: special functions

Week 11: Fourier series, integral transforms, & integral equations

Week 12: Fourier series, integral transforms, & integral equations

Week 13: Fourier series, integral transforms, & integral equations

Week 14: selected topic

### **Textbook**

Arfken, Weber, and Harris, *Mathematical Methods for Physicists, Seventh Edition: A Comprehensive Guide* (Academic Press, 2012)

### **Grading**

- Exams: 50% - One midterm and one final, equally weighted.
- Homework: 50% - Usually one assignment per week.

### **Academic Integrity**

From [<http://ctfe.gmu.edu/teaching/designing-your-syllabus/>]:

The integrity of the University community is affected by the individual choices made by each of us. Mason has an [Honor Code](#) with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

### **Disability Accommodations**

If you have a learning disability or other condition that may affect academic performance, please: a) make sure documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474; <http://ods.gmu.edu>) to determine the accommodations you need; and b) talk with me to discuss your accommodation needs.

### **University Policies**

See <http://universitypolicy.gmu.edu/>

### **Student Support Services**

See <http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/>