



Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

registrar.gmu.edu/facultystaff/curriculum

Action Requested:

Create new course Inactivate existing course

Modify existing course (check all that apply)

Title Credits Repeat Status Grade Type

Prereq/coreq Schedule Type Restrictions

Other: Course Description

Course Level:

Undergraduate

Graduate

College/School: COS Department: SPACS

Submitted by: Paul So Ext: 34377 Email: paso@gmu.edu

Subject Code: PHYS Number: 684 Effective Term: Fall Spring Year 2014

Summer

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Title: Current Quantum Mechanics I

Banner (30 characters max including spaces) _____

New _____

Credits: (check one) Fixed 3 Variable to

Repeat Status: (check one) Not Repeatable (NR) Repeatable within degree (RD) Repeatable within term (RT) Maximum credits allowed:

Grade Mode: (check one) Regular (A, B, C, etc.) Satisfactory/No Credit Special (A, B, C, etc. +IP)

Schedule Type: (check one) Lecture (LEC) Lab (LAB) Recitation (RCT) Internship (INT)

Independent Study (IND) Seminar (SEM) Studio (STU)

Prerequisite(s): PHYS 402 or 502, MATH 313 or 314, or equivalent

Corequisite(s): _____

Instructional Mode:

100% face-to-face

Hybrid: ≤ 50% electronically delivered

100% electronically delivered

Restrictions Enforced by System: Major, College, Degree, Program, etc. Include Code.

Are there equivalent course(s)?

Yes No

If yes, please list _____

Catalog Copy for NEW Courses Only (Consult University Catalog for models)

Description (No more than 60 words, use verb phrases and present tense)	Notes (List additional information for the course)
Fundamental concepts of quantum mechanics, including Dirac notation, quantum dynamics, theory of angular momentum, and symmetries.	
Indicate number of contact hours: _____ Hours of Lecture or Seminar per week: <u>3</u> Hours of Lab or Studio: _____	
When Offered: (check all that apply) <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Summer <input checked="" type="checkbox"/> Spring	

Approval Signatures

Department Approval _____ Date _____ College/School Approval _____ Date _____

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Courses Only

Graduate Council Member _____ Provost Office _____ Graduate Council Approval Date _____

For Registrar Office's Use Only: Banner _____ Catalog _____

Rationale for Proposal

1. Modification to the prerequisite list:

The existing prerequisite list:

PHYS 305, 308, MATH 313 and 314, or equivalent

was a legacy list from the time before the establishment of our current PHYS PhD program and our graduate quantum mechanics course was shared between the MS and our old PSCI PhD programs. In particular, we would like to switch out PHYS 308 with the more advanced PHYS 402 in the list. Our current PHYS 684 is geared toward traditional physics graduate students with an assumption that upon entering the class, they should be familiar with concepts covered in our undergraduate PHYS 402 (Introduction to Quantum Mechanics and Atomic Physics) or an equivalent course already. Materials covered in our modern physics course (PHYS 308) which is a pre-requisite for PHYS 402 are not sufficient in preparing our students for PHYS 684. Lastly, since PHYS 402 is typically the last required core for our undergraduate physics students and students typically would have taken PHYS 305 before PHYS 402, the inclusion of PHYS 402 as a prerequisite also makes the requirement of PHYS 305 from the old list unnecessary. Thus, we are also requesting to remove PHYS 305 in the new prerequisite list:

PHYS 402 or 502, MATH 313 or 314, or equivalent

(Note that PHYS 502 is the equivalent graduate version of PHYS 402.)

2. Modification to the course description:

The graduate level quantum courses (PHYS 684/784) have evolved over time as the PhD program in physics has evolved, so that the original descriptions no longer accurately reflect what is currently taught in the courses. For instance, six of the seven topics in the original Physics 784 catalog description are now currently covered in Physics 684. It is of particular urgency that these descriptions be updated since one of our PhD qualifiers is based on the content of Physics 684. The language that has been chosen for the revisions reflects one of the standard graduate level quantum mechanics textbooks, “Modern Quantum Mechanics” by J.J. Sakurai and J. Napolitano.

Original Physics 684 course description:

Fundamental concepts, including one-dimensional solutions of Schrodinger’s equations, operators in Hilbert space, observables, propagators, and harmonic oscillators.

Proposed revision:

Fundamental concepts of quantum mechanics, including Dirac notation, quantum dynamics, theory of angular momentum, and symmetries.