Course Change Request

New Course Proposal

Date Submitted: 11/01/19 9:57 am

Viewing: PHYS 591 : Systems for Quantum Scientists

Last edit: 12/13/19 2:20 pm

Changes proposed by: jrosenb4

Programs referencing this course	SC-MS-PHAE: Applied and Engineering Physics, MS

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

No

Effective Term:	Fall 2020		
Subject Code:	PHYS - Physics	**Course Number:**	591
Bundled Courses:			
Is this course replacing another course?	No		
Equivalent Courses:			
Catalog Title:	Systems for Quantum Scientists		
Banner Title:	Quantum Systems		
Will section titles vary by semester?	No		
Credits:	3		
Schedule Type:	Lecture		
Hours of Lecture or Seminar per week:	3		
Repeatable:	May be only taken once for credit, limited to 3 attempts (N3)	**Max Allowable Credits:**	9
Default Grade Mode:	Graduate Regular		
Recommended Prerequisite(s):			

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. 12/04/19 2:52 pm Ernest Barreto (ebarreto): Approved for PHYS GR Committee
2. 12/06/19 2:45 pm Paul So (paso): Approved for PHYS Chair

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:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:

This course will introduce students to real world problem solving in quantum information science and engineering using the principles of system architecture. These principles are useful to students independent of career path, but particularly important for a successful transition into a career in industry. Students will work together on teams to identify a scientific or technical challenge in quantum science and engineering. Key activities will include weekly meetings to plan and discuss key aspects of their challenge, meetings with industry experts regarding the principles of systems architecture, and designing a solution to their challenge. The report on the project design will be submitted in stages and will include a motivation, approach, detailed technical schematics, cost estimation, risk assessment, and risk mitigation strategies. The report will be evaluated by GMU faculty and industrial experts, and there will be a 'pitch' style presentation as part of the final project.

Justification:

This course is designed to get students involved in a wide-range of real-world problem solving. In discussions with people working in industry it is the ability for students (particularly those coming out of physics) to think about problems beyond the deep, technical aspects of a given problem. The ability to work on a team to solve a real-world problem requires more than technical expertise alone. Solutions must be

balanced against the available time, resources, cost, and other factors to be viable. This course will provide students with the opportunity to learn what it takes to solve challenging problems under realistic constraints and will fill a gap in the current education of our students.

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

Learning Outcomes:

- Develop team-based real-world problem-solving skills across a broad range of topics including technical, but also financial and time dependent aspects of a project.
- Become familiar with the requirements of planning large-scale technical projects.
- Understand the scientific and technical challenges for quantum technology.
- Prepare for summer quantum information science or engineering internship/research experience.

Attach Syllabus

New 591 Systems_for_physicists_I_syllabus.pdf

Additional Attachments

Staffing:

Patrick Vora

Relationship to Existing Programs:

This course will be a core course for the new Quantum Information Science and Engineering track within the Applied and Engineering Physics, MS. This is a program that we expect to thrive and bring in significant numbers of students in the coming years. It will also be an elective for the Applied and Engineering Physics, MS standard emphasis, and the Physics PhD programs.

Relationship to Existing Courses:

This course does not have pre-requisites and is not a pre-requisite for any other classes. It is open to graduate students in general and will be required for students on the new Quantum Information Science and Engineering track within the Applied and Engineering Physics, MS.

Additional Comments:

Reviewer Comments

SYLLABUS

PHYS 591: Systems for Quantum Scientists

Instructor: Patrick Vora
Seminar Day/time: TBD
Room: TBD
Credits: 3

This course will focus on introducing physicists to real world problem solving in quantum information science and engineering using the principles of system architecture. These principles are useful to students independent of career path, but particularly important for a successful transition into a career in industry.

This course requires that students to work together to identify a scientific or technical challenge in quantum science and engineering. Key activities for the students will include weekly meetings to plan and discuss key aspects of their challenge, meetings with industry experts regarding the principles of systems architecture, and the creation of a research proposal that includes a detailed design for the project. The proposal will be submitted in stages and must include a motivation, approach, detailed technical schematics, cost estimation, risk assessment, and risk mitigation strategies. The proposal will be evaluated by GMU faculty and industrial experts, and there will be a 'pitch' style presentation as a final project.

The goals of this course are:

- Develop real-world problem-solving skills across a broad range of topics including technical, but also financial and time dependent aspects of a project.
- Become familiar with the requirements of planning large-scale technical projects.
- Understand the scientific and technical challenges for quantum technology.
- Prepare for summer quantum information science or engineering internship/research experience.

Grading Policy

Students are expected to fully participate in the seminar to achieve a satisfactory grade. Grades for this course will be determined using the following components.

Component	Grading
Final presentation	60%
Participation	40%
Total	100%

Each student will be expected to contribute to their team project and participate in the presentation at the end of each semester. The Discussion lead grade will be based on the preparation and presentation of the material for those discussions.

Academic Integrity

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. There will be plenty of occasions to work with your peers in this course and working with your peers is actively encouraged. If the problem is designed to be a team project you should list the other team members as collaborators on the work. For homework you are always allowed and even encouraged to discuss and work on the problems with your peers. However**, the answers you turn in should be yours alone which means your own words and discussion of the answer to the problem**. Turning in work that is not your own and cheating on exams in any form will not be tolerated and will result in an automatic F on the assignment or exam and may result in referral to the university honor committee. Please read the honor code to which you commit as a member of the GMU community which is available at: http://academicintegrity.gmu.edu/honorcode/.

GMU Email Accounts

Students must use their Mason email accounts to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information. If you can not get your Mason e-mail you risk missing important information, for which you are responsible, pertaining to this class.

Office of Disability Services

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.gmu.edu. You must see me about any accommodations you need by February 5 or within 1 week of any new accommodation that may arise.

University Policies

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.