UNIVERSITY OF KENTUCKY

New Course Report

11/3/2014 8:09:26 AM

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OFFICE OF THE SENATE COUNCIL

1. General Information

1a. Submitted by the College of: ARTS &SCIENCES

Date Submitted: 9/11/2013

1b. Department/Division: Physics And Astronomy

1c. Contact Person

Name: Kwok-Wai Ng

Email: kwng@uky.edu

Phone: 7-1782

Responsible Faculty ID (if different from Contact)

Name:

Email:

Phone:

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? . Yes

Inquiry - Nat/Math/Phys Sci

2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: ~~PHY 170~~ PHY 140

2c. Full Title: Quantum Theory for Everyone

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

LECTURE: 3

2g. Grading System: Letter (A, B, C, etc.)

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester?

2j. Course Description for Bulletin: A lecture course to explore the surprising nature of the nano-world. Wave properties of matter, probabilistic interpretation, duality, causality, uncertainty principle and quantum entanglement. Technologies and discoveries which exploit quantum effects will be selectively covered.

2k. Prerequisites, if any:

2l. Supplementary Teaching Component:

3. Will this course taught off campus? No

If YES, enter the off campus address:

4. Frequency of Course Offering: Fall,

Will the course be offered every year?: Yes

If No, explain:

5. Are facilities and personnel necessary for the proposed new course available?: Yes

If No, explain:

6. What enrollment (per section per semester) may reasonably be expected?: 30

7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: No

Will it be of interest to a significant number of students outside the degree pgm?: Yes

If Yes, explain: This is a UK core course with a topic of popular interest. This course is desgined for students with no background in physical sciences.

8. Check the category most applicable to this course: Not Yet Found in Many (or Any) Other Universities ,

If No, explain:

9. Course Relationship to Program(s).

a. Is this course part of a proposed new program?: No

If YES, name the proposed new program:

b. Will this course be a new requirement for ANY program?: No

If YES, list affected programs:

10. Information to be Placed on Syllabus.

a. Is the course 400G or 500?: No

b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from **10.a** above) are attached: Yes

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1.How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2.How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.

3.How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.

4.Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

5.How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?

6.How do course requirements ensure that students make appropriate use of learning resources?

7.Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.

8.How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?

9.Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10.Does the syllabus contain all the required components? NO

11.I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE|SRDAS2|Sumit R Das|PHY 170 NEW Dept Review|20130916

SIGNATURE|RHANSON|Roxanna D Hanson|PHY 170 NEW College Review|20131120

SIGNATURE|JMETT2|Joanie Ett-Mims|PHY 170 PHY 170MINOR_TEXT_FOR_TITLEPHY 170MINOR_TEXT_FOR_TITLE&|20141016

SIGNATURE|REBEAT1|Ruth E Beattie|PHY 170 UKCEC Expert Review|20141016

SIGNATURE|JMETT2|Joanie Ett-Mims|PHY 170 NEW Undergrad Council Review|20141031

Courses | Request Tracking

New Course Form

https://myuk.uky.edu/sap/bc/soap/rfc?services=

Generate R

Open in full window to print or save

Attachments:

Browse... Upload File

	ID	Attachment
Delete	2159	Syllabus_final.pdf
Delete	2191	GenEd - Intellectual Inquiry Natural Physical Math
Delete	2195	About this new course proposal.pdf

First 1 Last

Select saved project to retrieve... Get New

(*denotes required fields)

1. General Information

a. * Submitted by the College of: ARTS & SCIENCES Submission Date: 9/11/2013

b. * Department/Division: Physics And Astronomy

c.

* Contact Person Name: Kwok-Wai Ng Email: kwng@uky.edu Phone: 7-1782

* Responsible Faculty ID (if different from Contact) Email: Phone:

d. * Requested Effective Date: ◉ Semester following approval OR ○ Specific Term/Year [1]

e.

Should this course be a UK Core Course? ◉ Yes ○ No

If YES, check the areas that apply:

- ☐ Inquiry - Arts & Creativity
- ☐ Inquiry - Humanities
- ☑ Inquiry - Nat/Math/Phys Sci
- ☐ Inquiry - Social Sciences
- ☐ Composition & Communications - I
- ☐ Composition & Communications - II
- ☐ Quantitative Foundations
- ☐ Statistical Inferential Reasoning
- ☐ U.S. Citizenship, Community, Diversity
- ☐ Global Dynamics

2. Designation and Description of Proposed Course.

a. * Will this course also be offered through Distance Learning? ○ Yes [4] ◉ No

b. * Prefix and Number: ~~PHY 170~~ PHY 140

c. * Full Title: Quantum Theory for Everyone

d. Transcript Title (if full title is more than 40 characters):

e. To be Cross-Listed [2] with (Prefix and Number):

f. * Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours[3] for each meeting pattern type.

3	Lecture		Laboratory[1]		Recitation		Discussion
	Indep. Study		Clinical		Colloquium		Practicum
	Research		Residency		Seminar		Studio
	Other	If Other, Please explain:					

g. * Identify a grading system:

◉ Letter (A, B, C, etc.)
○ Pass/Fail
○ Medicine Numeric Grade (Non-medical students will receive a letter grade)
○ Graduate School Grade Scale

h. * Number of credits: 3

i. * Is this course repeatable for additional credit? ○ Yes ◉ No

If YES: Maximum number of credit hours:

If YES: Will this course allow multiple registrations during the same semester? ○ Yes ○ No

j. * Course Description for Bulletin:

A lecture course to explore the surprising nature of the nano-world. Wave properties of matter, probabilistic interpretation, duality, causality, uncertainty principle and quantum entanglement. Technologies and discoveries which exploit quantum effects will be selectively covered.

k. Prerequisites, if any:

l. Supplementary teaching component, if any: ○ Community-Based Experience ○ Service Learning ○ Both

3. * **Will this course be taught off campus?** ○ Yes ◉ No

If YES, enter the off campus address:

4. **Frequency of Course Offering.**

a. * Course will be offered (check all that apply): ☑ Fall ☐ Spring ☐ Summer ☐ Winter

b. * Will the course be offered every year? ◉ Yes ○ No

If No, explain:

5. * **Are facilities and personnel necessary for the proposed new course available?** ◉ Yes ○ No

If No, explain:

6. * **What enrollment (per section per semester) may reasonably be expected?** 30

7. **Anticipated Student Demand.**

a. * Will this course serve students primarily within the degree program? ○ Yes ◉ No

b. * Will it be of interest to a significant number of students outside the degree pgm? ◉ Yes ○ No

If YES, explain:

This is a UK core course with a topic of popular interest. This course is desgined for students with no background in physical sciences.

8. * **Check the category most applicable to this course:**

☐ Traditional – Offered in Corresponding Departments at Universities Elsewhere
☐ Relatively New – Now Being Widely Established
☑ Not Yet Found in Many (or Any) Other Universities

9. **Course Relationship to Program(s).**

a. * Is this course part of a proposed new program? ○ Yes ◉ No

If YES, name the proposed new program:

b. * Will this course be a new requirement [5] for ANY program? ○ Yes ◉ No

If YES [5], list affected programs::

10. **Information to be Placed on Syllabus.**

a. * Is the course 400G or 500? ○ Yes ◉ No
If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in **10.b**. You must include: (i) identi additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR

b. ☑ * The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if appl **10.a** above) are attached.

[1] Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.
[2] The chair of the cross-listing department must sign off on the Signature Routing Log.

PHY 170
Quantum Theory for Everyone

Instructor: Professor Michael A. Kovash
Office Address: Chem-Phys 371
Email: kovash@pa.uky.edu
Office Phone: 257-1150
Office hours: Tue., Wed., Thur. 8:30-9:30

Course Description:
A lecture course to explore the surprising nature of the nano-world. Wave properties of matter, probabilistic interpretation, duality, causality, uncertainty principle and quantum entanglement. Technologies and discoveries which exploit quantum effects will be selectively covered.

Prerequisites: None

Student Learning Outcomes:

After completing this course, the student will be able to:

1. Distinguish the difference between classical and modern physics, and realize the shortcoming of classical physics.
2. Describe the nature of the nano-world with the proper language of quantum mechanics.
3. Explain how devices like laser and transistor work.
4. Understand the scientific process in which observations are made, theories are established and then experimentally tested.

Course goals or objectives:

This course is about the quantum theory. We will explore its history and its workings, clearly contrasting them with the methods of Newtonian, or `classical' physics. In the early part of the 20th century the quantum theory grew out of a need to describe phenomena where classical methods were observed to fail. We will explore these ideas, describing both how the quantum theory is applied in these important systems, and how it remedies the observed deficiencies of classical physics. We also will discuss a few modern tools which exploit quantum effects such as the laser, the transistor, and the solar cell, where the requirements imposed by the theory determine in each case the instrument's unique operational characteristics. Throughout our discussion we will use only a minimum of mathematics, relying instead on physical arguments and on the frequent use of analogies constructed between quantum systems and their classical counterparts.

Required Materials:

We will have readings from three "popular" accounts of modern physics: Quantum Physics for Poets, by Leon Lederman and Christopher Hill, Absolutely Small, by Michael Fayer, and Quantum Enigma, by Bruce Rosenblum and Fred Kuttner.

Description of Course Activities and Assignments

Class will meet in a seminar room for 50 minutes, three days per week. During our class meetings we will discuss primarily the reading assignment. Frequently, we will illustrate our discussion with experiments that we perform using demonstration apparatus.

Class Participation

This class will be presented in a seminar format, not as a series of lectures. Therefore, everyone is expected to contribute to the class discussion - both by asking as well as by answering questions related to the discussion topic. Through discussion, we can understand the concepts and principles better. A small but significant part of the final course grade will be determined by your class participation - evaluated in terms of both quantity and quality.

Discussion Facilitator

Additionally, each week two students will serve as discussion facilitators. It will be the responsibility of these students to be especially well prepared for the week's discussion. They may, for example, do some outside reading, prepare a set of relevant questions, issues, or illustrations for the group to consider, and generally assume a significant role during all three of their assigned class periods. Our class discussions will generally follow the assigned reading topics, and the facilitators should therefore use this material as the basis for their contributions. (The instructor will bring a set of slides which will serve as the primary teaching resource for the class period, so the facilitators will not be responsible for delivering the main body of the daily lesson.)

Homework

Each Friday we will distribute a schedule for the following week's work. On this schedule you will find a reading assignment from one or more of our textbooks, as well as a listing of assigned homework problems. You will not be able to find the answer directly from the text. These problems often involve some thinking and you can deduce the results from some basic principles. This is the same approach used by physicists in solving real world problems. Homework will usually be due each Monday, at which time the homework papers will be collected and graded.

Quiz

A 15-minute quiz will be given each week - usually at the start of the Wednesday class. The quiz questions will in general cover the reading assignment, the topics discussed during the previous few lectures, and the most recent homework assignment. Students who miss a class without a

valid excuse will receive a grade of zero for that day's work. At the end of the term we will drop each student's two lowest quiz scores.

Examinations

There will be two 50-minute exams timed at roughly 6-week intervals during the semester. There will be no written final exam. Instead, your project report will be due at the time of the scheduled final exam, during exam week.

Project

Working in teams of three, everyone will participate in a take-home experimental project this semester. This will involve the collection, analysis and interpretation of data, as well as the preparation of a final project report. A list of potential topics which illustrate or test a concept that is in some way related to our discussion of the quantum theory will be supplied by the instructor, and each team will be responsible for developing their selected topic into a full-fledged experimental project. Specific project requirements will be provided separate from this syllabus, but in general every group will be expected to develop a means for easily testing or illustrating a relevant physical concept, and then carrying out the investigation and writing up the results. It is expected that students will consult web-based resources to provide background information for their investigation. In addition to a final report which every student will prepare separately, the group will be responsible for assembling a poster which will be presented in the hallway of the Chemistry-Physics Building.

Course Assignments

Your final score will be tabulated by summing the component scores with the following weightings:

Class Participation 10%
Discussion Facilitator 15%
Homework 15%
Weekly Quiz 15%
Hour Exam 1 15%
Hour Exam 2 15%
Project 15%

Summary Description of Course Assignments

Class Participation: everyone is expected to contribute to the class discussion - both by asking as well as by answering questions related to the discussion topic.

Discussion facilitator: each week two students will serve as discussion facilitators.

Homework: Homework will be distributed each Friday and due the following Monday.

Quiz: A 15-minute quiz will be given at the start of each Wednesday class.

Examinations: Two 50-minute exams timed at roughly 6-week intervals during the semester.

Project: Working in teams of three, everyone will participate in a take-home experimental project. Each student will prepare a final project report individually, and a poster as a team.

Course Grading (if 4xxG or 5xx, must have one for grad and ugrad students)

Grading scale for undergraduates:

92 – 100% = A
80-91% = B
65-79% = C
50-64%=D
49% or below = E

Final Exam Information

There will be no written final exam. Instead, your project report will be due at the time of the scheduled final exam, during exam week.

Mid-term Grade:
Mid-term grades will be posted in myUK prior to the mid-term deadline published by the Registrar (http://www.uky.edu/Registrar/AcademicCalendar.htm). This grade will include all work that has been completed before the close of mid-term.

Course Policies:

Submission of Assignments:

Homework is due at the beginning of each Monday class. Late homework until the beginning of Wednesday class will be deducted by 32% of your true score. No late homework will be accepted after the beginning of Wednesday class.

Attendance Policy:

This is more like a seminar class, so attendance is mandatory. Unexcused absence will affect your participation grade directly.

Excused Absences:

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

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 no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Verification of Absences:

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required.

Academic Integrity:

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 and may result in permanent dismissal. 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 at the following website: http://www.uky.edu/Ombud. 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.

Part II of Student Rights and Responsibilities (available online http://www.uky.edu/StudentAffairs/Code/part2.html) 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 the question of plagiarism involving their own 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 anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. 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.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she 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 (Section 6.3.1).

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

Accommodations due to disability:
If you have a documented disability that requires academic accommodations, please see me as soon as possible after class or 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 (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Classroom Behavior Policies

Respectful dialogue is expected during class discussion. Please turn off all electronic devices like cellphones, ipad, laptop etc. before class. Laptop is allowed only when internet access is needed.

Course evaluation

Course evaluations are an important component of our Department's instructional program. An on-line course evaluation system was developed to allow each student ample time to evaluate each component of the course and instructor, thus providing the Department with meaningful numerical scores and detailed commentary while minimizing the loss of instructional time in the classroom. To access the system, simply go the Department of Physics Web page at www.pa.uky.edu and click on the link for Course Evaluations; then follow the instructions. You will need to use your student ID# to log into the system, and this will also allow us to monitor who has filled out evaluations. However, when you log-in you will be assigned a random number that will keep all your comments and scores anonymous.

The online course evaluation window for this semester is November 14th to Dec 5th.

Tentative Course Schedule

Our class discussions will briefly follow the following topics over the semester:

1. A description of classical physics as applied to systems of particles and waves;
2. A presentation of some of the observed inadequacies of classical formulations of physics;
3. A description of the quantum theory and its application to many important model systems.
4. A discussion of several attempts to interpret the `meaning` of the quantum theory; and
5. A description of some technologically important applications of the quantum theory.

Course Review Form
Inquiry in the Natural/Mathematical/Physical Sciences

Reviewer Recommendation
Accept ☐ Revisions Needed ☐

Course: PHY 170

Using the course syllabus as a reference, identify when and how the following learning outcomes are addressed in the course. Since learning outcomes will likely be addressed multiple ways within the same syllabus, please identify a representative example (or examples) for each outcome.

☐ Course activities that enable students to demonstrate an understanding of methods of inquiry that lead to scientific knowledge and distinguish scientific fact from pseudoscience.

Example(s) from syllabus:

Student Learning Outcomes:...Understand the scientific process in which observations are made, theories are established and then experimentally tested.

Project .... in general every group will be expected to develop a means for easily testing or illustrating a relevant physical concept,...

Tentative course schedule:... 2. A presentation of some of the observed inadequacies of classical formulations of physics; 3. A description of the quantum theory and its application to many important model systems.....

Brief Description:
Quantum physics is a good topics to demonstrate the stringent scientific process that leads to an acceptable conclusion. The success of classical physics and its ultimate failure shows the importance of experimentation in the scientific process. The rise of quantum physics also demonstrates an important property of scientific knowledge that it can be corrected and modified according to new findings and data. This is in contrary to most people idea of a scientific theory. Quantum theory is an abstract theory involving particle so small that we cannot "see". However, this does not exempt it from being tested by experiments and observations. Over the course, students will gradually establish the proper idea of scientific method.

☐ Course activities that enable students to demonstrate an understanding of the fundamental principles in a branch of science.

Example(s) from syllabus:

Course description: ...Wave properties of matter, probabilistic interpretation, duality, causality, uncertainty principle and quantum entanglement.

Class participation ...Through discussion, we can understand the concepts and principles better....

Homework ...These problems often involve some thinking and you can deduce the results from some basic principles....

Brief Description:
Quantum physics is the pillar of modern physics. It includes many fundamental principles in physics like the Heisenbery Uncertainy Principle, duality of wave and particles, and Principle of Superpositon

etc. All these will be covered through class discussion and course project.

☐ Course activities that enable students to demonstrate the application of fundamental principles to interpret and make predictions in that branch of science.

Example(s) from syllabus:

Student Learning Outcomes:
...2. Describe the nature of the nano-world with the proper language of quantum mechanics. 3. Explain how devices like laser and transistor work...

Project ...Working in teams of three, everyone will participate in a take-home experimental project this semester. This will involve the collection, analysis and interpretation of data, as well as the preparation of a final project report...

Tentative course schedule ...4. A discussion of several attempts to interpret the `meaning` of the quantum theory;

Brief Description:
A physics course is perfect for this, even at 100 level. In this course student will study many cases and learn how physicists use some fundamental principles to make prdictions before discoveries are made. The prediction and discovery of positron (antiparticle of electron) is a good example of this. Students will also do simple calculations in the homework in which they will see the consequences in varying some parameters, For example, they will learn how the wavelength of an electron is affected if it is moving faster, and how will that affect the resolution of an electron microscope.

☐ Course activities that enable students to demonstrate their ability to discuss how at least one scientific discovery changed the way scientists understand the world.

Example(s) from syllabus:

...In the early part of the 20th century the quantum theory grew out of a need to describe phenomena where classical methods were observed to fail. We will explore these ideas, describing both how the quantum theory is applied in these important systems, and how it remedies the observed deficiencies of classical physics.

This class will be presented in a seminar format, not as a series of lectures....Through discussion, we can understand the concepts and principles better. A small but significant part of the final course grade will be determined by your class participation - evaluated in terms of both quantity and quality.

Brief Description:

Quantum Theory changed every way scientists understand the mciro world. When things go small, pacticles like proton and electron can behave like wave, and wave like light can behave like a particle. It also challenged many traditional viewpoint, like accuracy and causility. In quantum physics, it is impossible to measure a physical quantity to exact, because the measurement will unavoidably disturb the system. This violates the traditional thinking that we can make a measurement as precise as we want, within the instrumentation limit.

☐ Course activities that enable students to demonstrate their ability to discuss the interaction of science with society.

Example(s) from syllabus:

Therefore, everyone is expected to contribute to the class discussion - both by asking as well as by answering questions related to the discussion topic. Through discussion, we can understand the concepts and principles better.

Additionally, each week two students will serve as discussion facilitators. It will be the responsibility of these students to be especially well prepared for the week's discussion...

Brief Description:

Quantum physics are deeply rooted in philosophy and cultural thinking. The students will learn how to challenge traditional believes and misconceptions and shape new ideas through discussion with their peers.

☐ A hands-on student project is required. This project enables students to demonstrate their ability to conduct a scientific project using scientific methods that include design, data collection, analysis, summary of the results, conclusions, alternative approaches, and future studies. Describe the required student product (paper/ laboratory report) based on the hands-on project.

Working in teams of three, everyone will participate in a take-home experimental project this semester. This will involve the collection, analysis and interpretation of data, as well as the preparation of a final project report. A list of potential topics which illustrate or test a concept that is in some way related to our discussion of the quantum theory will be supplied by the instructor, and each team will be responsible for developing their selected topic into a full-fledged experimental project. Specific project requirements will be provided separate from this syllabus, but in general every group will be expected to develop a means for easily testing or illustrating a relevant physical concept, and then carrying out the investigation and writing up the results.

☐ Course activities that demonstrate the integration of information literacy into the course.

Example(s) from syllabus:

It is expected that students will consult web-based resources to provide background information for their investigation.

In addition to a final report which every student will prepare separately, the group will be responsible for assembling a poster which will be presented in the hallway of the Chemistry-Physics Building.

Brief Description:

There are a lot of information on quantum physics in printed form, or in the internet. Students will have many opporitunities to look up infromation, share the information with their peers, and understand the information through discussion. They will also learn how to track scientific papers, and how to cite other people work in the final report they prepare. We will also collect and analysis information on news event related to our study (like the d-wave computer and the discovery of Higgs bosons) when it happens.

Reviewer's Comments

About this new course proposal:

The Physics and Astronomy Department originally planned to offer three 100 level UK Core courses for non-physical sciences students, PHY 120 How Things Work, PHY130 Physics of Energy, and PHY170 Quantum Theory for Everyone (present proposal). This is the final installation of this series of UK Core courses.

The course has been tested and taught by Professor Mike Kovash for three times in the discovery seminar program.

The UPCC proposed to set up this course as a regular physics course and the proposal was approved by the general faculty in a faculty meeting.