# 1. General Information

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

   Date Submitted: 5/6/2013

1b. Department/Division: Physics And Astronomy

1c. Contact Person

   Name: Kwok-Wai Ng (DUS)

   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? No

# 2. Designation and Description of Proposed Course

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

2b. Prefix and Number: PHY 508

2c. Full Title: Computational Physics

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

   LECTURE: 2

   LABORATORY: 2

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 laboratory and lecture course using computational and numerical methods to investigate different phenomena in selected topics of physics. Lecture 2 hours; laboratory, 2 hours per week.

2k. Prerequisites, if any: PHY360

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?:   15

7. Anticipated Student Demand

   Will this course serve students primarily within the degree program?:   Yes

   Will it be of interest to a significant number of students outside the degree pgm?:   No

   If Yes, explain:   [var7InterestExplain]

8. Check the category most applicable to this course:   Traditional – Offered in Corresponding Departments at Universities Elsewhere,

   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?:   Yes

   If YES, list affected programs:   PHY BS program - This new course will replace the PHY422 as an elective of physics laboratory required by the Physics BS program.

10. Information to be Placed on Syllabus.

   a. Is the course 400G or 500?:   Yes

   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|MJCAVA1|Michael J Cavagnero|Dept approval for ZCOURSE_NEW PHY 508|20130130

   SIGNATURE|RHANSON|Roxanna D Hanson|College approval for ZCOURSE_NEW PHY 508|20130130

   SIGNATURE|JMETT2|Joanie Ett-Mims|Undergrad Council approval for ZCOURSE_NEW PHY 508|20130214

   SIGNATURE|ZNNIKO0|Roshan N Nikou|Graduate Council approval for ZCOURSE_NEW PHY 508|20130418

e

| Courses | Request Tracking |
|---------|------------------|

## New Course Form

Open in full window to print or save

Generate F

Attachments:

[ Browse... ]  Upload File

| | ID | Attachment |
|---|------|------------|
| Delete | 1110 | About this new course proposal.pdf |
| Delete | 1112 | Syllabus_v1.pdf |
| Delete | 1410 | PHY_UG-BS_chg_Feb2013_PHY422to508.doc |

First  1  Last

Select saved project to retrieve...  [ ]  Get  New

(*denotes required fields)

### 1. General Information

a. * Submitted by the College of: ARTS & SCIENCES        Today's Date: 5/6/2013

b. * Department/Division: Physics And Astronomy

c.

   * Contact Person Name: Kwok-Wai Ng (DUS)   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          ☐ Composition & Communications - II

   ☐ Inquiry - Humanities                 ☐ Quantitative Foundations

   ☐ Inquiry - Nat/Math/Phys Sci          ☐ Statistical Inferential Reasoning

   ☐ Inquiry - Social Sciences            ☐ U.S. Citizenship, Community, Diversity

   ☐ Composition & Communications - I     ☐ 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 508

c. * Full Title:  Computational Physics

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.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | Lecture | 2 | 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

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 laboratory and lecture course using computational and numerical methods to investigate different phenomena in
selected topics of physics.  Lecture 2 hours; laboratory, 2 hours per week.
```

k. Prerequisites, if any:

```
PHY360
```

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?**    15

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:

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 [6], list affected programs::

      ```
      PHY BS program - This new course will replace the PHY422 as an elective of physics laboratory required by the
      Physics BS program.
      ```

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) ident
       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.
[3] In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, re
two hours per week for a semester for one credit hour. (from SR 5.2.1)
[4] You must also submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.
[5] In order to change a program, a program change form must also be submitted.

Rev 8/09

Submit as New Proposal     Save Current Changes     Delete Form Data and Attachments

About this new course proposal:

The original PHY422 Computational Physics was taught by Dr. John Connolly of the Center of Computational Sciences. After the retirement of Dr. Connolly, this course has to be taught by the Physics faculty. At about the same time, Professor Ribhu Kaul initiated a graduate level computational physics course on a temporary basis, as PHY600 Selected Topics in Advanced Physics.

After many discussions between the UPCC and GPCC on the needs of computational physics for both of our undergraduate and graduate students, it was proposed to establish a new graduate level computational physics course (PHY508, this proposal) to replace the PHY422 so the graduate students can receive graduate credits. Like the PHY422, undergraduate students can use this course as a laboratory course to satisfy the major graduation requirements. The contents of this new course have been thoroughly tested by Professor Kaul. He has taught both PHY600 and PHY422 (Fall 2012) with both undergraduate and graduate students enrolled to find a suitable balance. The proposal was approved by the general faculty in a faculty meeting on April 2, 2012.

PHY 508
Computational Physics

| | |
|---|---|
| **Instructor:** | Dr. Ribhu Kaul |
| **Office Address:** | Rm 383 Chemistry-Physics Building |
| **Email:** | rkk@pa.uky.edu |
| **Office Phone:** | 257-1697 |
| **Office hours:** | Thursday |
| | 2 to 4:00 PM |
| | Or appointment via email |

## Course Description:

A laboratory and lecture course using computational and numerical methods to investigate different phenomena in selected topics of physics. Lecture 2 hours; laboratory, 2 hours per week.

## Prerequisites:
PHY360 Modern Physics

## Student Learning Outcomes:

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

1. Acquire intermediate object-oriented C++ programming skills
2. Analyze an issue and develop a solution
3. Fitting numerical data to a model

## Course goals or objectives:

The goal of this class is to introduce you to computational physics. Computational physics can mean so many different things depending who you ask, that it would be hopeless to cover all aspects of it in any classroom setting. What I will teach you in this semester is how to approach physics problems numerically by using existing tools and inventing/adapting your own.

## Required Materials:

Textbook:
Computational Physics (2$^{nd}$ Edition) by Nicholas J. Giordano and Hisao Nakanishi. Published by Benjamin Cummings.

## Description of Course Activities and Assignments

The class will meet on Tuesday and Thursday from 4:00-6:00pm. On Tuesdays it will meet in Chemistry-Physics Bldg-Rm. 183. On Thursdays, we will meet at the Macintosh lab

in the Science library (King) 213G (KL 213G), also from 4:00-6:00pm. On Thursday, in the computer laboratory we will do programming to test the theory and model under study. In the following Tuesday class we will discuss about our findings and learn the physics behind.

*Homework*

Homework is the report of what you do and what you find in the laboratory. It is due in t

*Class participation*

Your class participation and interest in the classroom and outside it, improves the quality of instruction and the general atmosphere in the class immensely, so please take your role as the most crucial part of this course seriously. Participation grade will be assigned based on your attendance, preparedness in class materials, and participation in class discussion.

*Class work*

In the laboratory you have to develop some programs to investigate the physics problem. Quality of the program is important for the effectiveness of the study. These programs constitute the class work to be graded according to the logic flow and the efficiency of the program.

*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.

**Course Assignments**

> 4 short homeworks at 50 points each and 4 long homeworks at 100 points each
> 10 classworks at 30 points each
> Class participation at 2 points each, up to a total of 70 points
> Completing on-line course evaluation 30 points

**Summary Description of Course Assignments**

The course can be briefly divided into two parts. In the first seven weeks we will learn basic skill in programming and computational methods. Four homework will be collected (50 points

each) in this period of time. Starting from the eighth week we will apply the techniques we learn to analysis four physics problems. We will have about two weeks for each problem. At the end of the unit, you are expected to submit a report to discuss what you have found and learned. Each report will worth 100 points in the homework category. You need to summit all the codes you developed in the laboratory together with the homework, but they will be graded separately as class work.

## Course Grading

Grading scale for undergraduates:
  90 – 100% = A
  78-89% = B
  65-77% = C
  50-64%=D
  49% or below = E

Grading scale for graduate students (no D for Grad Students):
  92-100% = A
  80 – 91% = B
  79% or below = C

Note that graduate students are required to complete more tasks in every laboratory. These addition tasks involve knowledge in more advanced physics.

## Final Exam Information
This is a laboratory course, so there is no test or final examination.

## 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:

All C++, python programs should be emailed to me with the subject line: \PHY422: HW 1", \PHY422: HW 2" etc. Please use this subject heading to avoid your email from getting misplaced. In addition a print out of your code, plots and write-up need to be delivered to me by 4:00 pm on the day it is due. The preferred method to submit the homework write-ups is at the start of class on Tuesday. If you would like to submit your write-up earlier, please put it in the envelope outside my office which is marked PHY422 or slip it under my office door. Please note that **both** a print-out and electronic copies of your codes are required to be delivered.

### Attendance Policy

You are required to attend all classes and laboratories. Unexcused absence will affect your participation grade.

**Excused Absence:**
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**
I would like to request that during the classroom time you refrain from browsing the internet or checking your email on your phone or on your laptop, since I have found this disrupts the atmosphere in the classroom for everyone.

**Tentative Course Schedule**

**Part I. Basic computational skill used in physics**

Week 1 (Aug 22)   The UNIX programming environment.

Week 2 (Aug 27)   Intermediate object-oriented C++ programming skills.

Week 3 (Sept 3)   Production of publication quality two-dimensional graphs.

Week 4 (Sept 10)   Representation of numbers on a computer.  Random number generation.

Week 5 (Sept 17)   Automating analysis tasks using the \python" language.

Week 6 (Sept 24)   Error analysis. Systematic vs stochastic errors.

Week 7 (Oct 1)     Fitting numerical data to a model.

**Part II.  Special topics in physics**

Week 8 (Oct 8)      Chaos in the driven non-linear pendulum

Week 10 (Oct 22)    Percolation transition

Week 12 (Nov 5)   Monte Carlo simulations of the Ising model

Week 15 (Nov 26) Molecular dynamics of the Lennard-Jones liquid

# CHANGE UNDERGRADUATE PROGRAM FORM

## 1. General Information

| | | | |
|---|---|---|---|
| College: | Arts and Sciences | Department: | Physics and Astronomy |
| Current Major Name: | Physics | *Proposed Major Name:* | *Physics* |
| Current Degree Title: | BS | *Proposed Degree Title:* | *BS* |
| Formal Option(s): | _____ | *Proposed Formal Option(s):* | _____ |
| Specialty Field w/in Formal Option: | _____ | *Proposed Specialty Field w/in Formal Options:* | _____ |

Date of Contact with Associate Provost for Academic Administration[1]: _____

| | | | |
|---|---|---|---|
| Bulletin (yr & pgs): | 12-13 pg166 | CIP Code[1]: _____ | Today's Date: 2/8/2013 |

Accrediting Agency (if applicable): _____

Requested Effective Date: ☐ Semester following approval.   OR   ☒ Specific Date[2]: Immediately after approval of PHY508

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

## 2. General Education Curriculum for this Program:

The new General Education curriculum is comprised of the equivalent of 30 credit hours of course work. There are, however, some courses that exceed 3 credits & this would result in more than 30 credits in some majors.

- There is no foreign language requirement for the new Gen Ed curriculum.
- There is no General Education Electives requirement.

**Please list the courses/credit hours currently used to fulfill the University Studies/General Education curriculum:**

n/a

**Please identify below the suggested courses/credit hours to fulfill the General Education curriculum.**

| General Education Area | | Course | Credit Hrs |
|---|---|---|---|
| I. Intellectual Inquiry (one course in each area) | | | |
| | Arts and Creativity | *n/a* | *n/a* |
| | Humanities | *n/a* | *n/a* |
| | Social Sciences | *n/a* | *n/a* |
| | Natural/Physical/Mathematical | *n/a* | *n/a* |
| II. Composition and Communication | | | |
| | Composition and Communication I | CIS or WRD 110 | 3 |
| | Composition and Communication II | CIS or WRD 111 | 3 |
| III. Quantitative Reasoning (one course in each area) | | | |

---

[1] Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration (APAA). If you do not know the CIP code, the (APAA) can provide you with that during the contact.

[2] Program changes are typically made effective for the semester following approval. No program will be made effective until all approvals are received.

Rev 01/11

| | | _n/a_ | _n/a_ |
|---|---|---|---|
| | Quantitative Foundations[3] | | |
| | Statistical Inferential Reasoning | _n/a_ | _n/a_ |

| IV. Citizenship (one course in each area) | | | |
|---|---|---|---|
| | Community, Culture and Citizenship in the USA | _n/a_ | _n/a_ |
| | Global Dynamics | _n/a_ | _n/a_ |

| | | |
|---|---|---|
| **Total General Education Hours** | | _n/a_ |

**3. Explain whether the proposed changes to the program (as described in sections 4 to 12) involve courses offered by another department/program. <u>Routing Signature Log must include approval by faculty of additional department(s).</u>**

n/a

**4. Explain how satisfaction of the University Graduation Writing Requirement will be changed.**

| Current | Proposed |
|---|---|
| ☐ Standard University course offering. <br> List: <u>n/a</u> | ☐ *Standard University course offering.* <br> *List:* n/a |
| ☐ Specific course – list:   n/a | ☐ *Specific course) – list:*   *n/a* |

**5. List any changes to college-level requirements that must be satisfied.**

| Current | Proposed |
|---|---|
| ☐ Standard college requirement. <br> List: <u>n/a</u> | ☐ *Standard college requirement.* <br> *List:* <u>n/a</u> |
| ☐ Specific required course – list:   n/a | ☐ *Specific course – list:*   <u>n/a</u> |

**6. List pre-major or pre-professional course requirements that will change, including credit hours.**

| Current | Proposed |
|---|---|
| <u>n/a</u> | <u>n/a</u> |

**7. List the major's course requirements that will change, including credit hours.**

| Current | Proposed |
|---|---|
| plus two of the following courses: <br> AST/PHY 395 Independent Work in Astronomy/Physics ..... 3 <br> PHY 402G Electronic Instrumentation and Measurements ..... 3 <br> PHY 422 Computational Physics Laboratory ..... 3 <br> PHY 435 Intermediate Physics Laboratory ..... 3 | *plus two different courses from the following:* <br> *AST/PHY 395 Independent Work in Astronomy/Physics ..... 3* <br> *PHY 402G Electronic Instrumentation and Measurements ..... 3* <br> *PHY 508 Computational Physics ..... 3* <br> *PHY 435 Intermediate Physics Laboratory ..... 3* |

**8. Does the pgm <u>require</u> a minor AND does the proposed <u>change</u> affect the required minor?  ☐ N/A     ☐ Yes ☐ No**
If "Yes," indicate current courses and proposed changes below.

| Current | Proposed |
|---|---|
| <u>n/a</u> | <u>n/a</u> |

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[3] Note that MA 109 is NOT approved as a Quantitative Foundations course. Students in a major requiring calculus will use a calculus course (MA 113, 123, 137 or 138) while students not requiring calculus should take MA 111, PHI 120 or another approved course.

# CHANGE UNDERGRADUATE PROGRAM FORM

**9. Does the proposed change affect any option(s)?**  ☐ N/A  ☐ Yes  ☐ No

If "Yes," indicate current courses and proposed changes below, including credit hours, and also specialties and subspecialties, if any.

| Current | Proposed |
|---------|----------|
| n/a | n/a |

**10. Does the change affect pgm requirements for number of credit hrs outside the major subject in a related field?**  ☐ Yes  ☐ No

If so, indicate current courses and proposed changes below.

| Current | Proposed |
|---------|----------|
| n/a | n/a |

**11. Does the change affect pgm requirements for technical or professional support electives?**  ☐ Yes  ☐ No

If so, indicate current courses and proposed changes below.

| Current | Proposed |
|---------|----------|
| n/a | n/a |

**12. Does the change affect a minimum number of free credit hours or support electives?**  ☐ Yes  ☐ No

If "Yes," indicate current courses and proposed changes below.

| Current | Proposed |
|---------|----------|
| n/a | n/a |

**13. Summary of changes in required credit hours:**

| | | Current | Proposed |
|---|---|---------|----------|
| a. | Credit Hours of Premajor or Preprofessional Courses: | n/a | n/a |
| b. | Credit Hours of Major's Requirements: | n/a | n/a |
| c. | Credit Hours for Required Minor: | n/a | n/a |
| d. | Credit Hours Needed for a Specific Option: | n/a | n/a |
| e. | Credit Hours Outside of Major Subject in Related Field: | n/a | n/a |
| f. | Credit Hours in Technical or Professional Support Electives: | n/a | n/a |
| g. | Minimum Credit Hours of Free/Supportive Electives: | n/a | n/a |
| h. | Total Credit Hours Required by Level: 100: | n/a | n/a |
| | 200: | n/a | n/a |
| | 300: | n/a | n/a |
| | 400-500: | n/a | n/a |
| i. | Total Credit Hours Required for Graduation: | n/a | n/a |

**14. Rationale for Change(s) – if rationale involves accreditation requirements, please include specific references to that.**

PHY422 ceased to exist and will be replaced by a similar graduate level course PHY508. Accordingly the PHY422 in the BS lab requirements has to be changed to PHY508. The first statement is rephased to clarify the fact that the requirement cannot be satisfied by taking AST/PHY395 repeatedly.

**15. List below the typical semester by semester program for the major. If multiple options are available, attach a separate sheet for each option.**

| YEAR 1 – FALL: (e.g. "BIO 103; 3 credits") | | YEAR 1 – SPRING: | |
|---|---|---|---|
| YEAR 2 - FALL : | | YEAR 2 – SPRING: | |
| YEAR 3 - FALL: | | YEAR 3 - SPRING: | |
| YEAR 4 - FALL: | | YEAR 4 - SPRING: | |

# CHANGE UNDERGRADUATE PROGRAM FORM

## Signature Routing Log

**General Information:**

Current Degree Title and Major Name:     BS Physics

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

INSTRUCTIONS:
Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

**Internal College Approvals and Course Cross-listing Approvals:**

| Reviewing Group | Date Approved | Contact Person (name/phone/email) | Signature |
|---|---|---|---|
| Physics & Astronomy | 2/8/13 | Kwok-Wai Ng, DUS / 7-1782 / kwng@uky.edu | |
| Physcis & Astonomy | 2/8/13 | Mike Cavagnero, Chair / 7-6733 / mike@pa.uky.edu | |
| | | /          / | |
| | | /          / | |
| A&S EPC and Dean | 2/12/13 | Anna Bosch, Associate Dean / 7-6689 / bosch@uky.edu | |

**External-to-College Approvals:**

| Council | Date Approved | Signature | Approval of Revision[4] |
|---|---|---|---|
| Undergraduate Council | | | |
| Graduate Council | | | |
| Health Care Colleges Council | | | |
| Senate Council Approval | | University Senate Approval | |

Comments:

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[4] Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.