UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: John Gizis phone number x2668

Department: Physics and Astronomy email address gizis@udel.edu

Date: 15 October 2009

Action: **Revise Concentration**
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term **10F**
(use format 04F, 05W)

Current degree **BS**
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: _____
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

Revising or Deleting:

Undergraduate major / Concentration: _____
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: _____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: _____
(**Must attach** your Graduate Program Policy Statement)

Graduate Program of Study: _____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: _____

Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.

List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?
(Be aware that approval of the curriculum is dependent upon these courses successfully passing through

the Course Challenge list. If there are no new courses enter "None")

PHYS630 GALAXIES, PHYS639 TOPICS IN ASTROPHYSICS

Currently students are required to take two advanced classes at the 400 or 600-level in astrophysics, but there are only two such classes allowed. These classes will allow more choice.

Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education: http://www.ugs.udel.edu/gened/

This is a minor revision to fill a hole in the physics requirements, and to make the requirements more flexible.

Identify other units affected by the proposed changes:
(Attach permission from the affected units. If no other unit is affected, enter "None")

None

Describe the rationale for the proposed program change(s):
(Explain your reasons for creating, revising, or deleting the curriculum or program.)

Addition of PHYS310 (Thermodynamics): This class provides. Although most students took it anyway it was clear that skipping the class left a significant hole in the student's understanding of basic physics.

Dropping the PHYS133/144/145 (Introduction to Astronomy): Student exit interviews alerted us that these classes (any one of the three was required), geared mainly toward non-majors were not as useful to the students as we had hoped. Dropping this class allows us to add 310 without changing the number of credits.

Choice: PHYS434/630/632/633/634/635/639/644 (Various advanced astrophysics classes) Currently we require 632 and 633. Because we now teach a greater variety of advanced as astrophysics classes than in previous decades, it is appropriate to allow the students the choice of which (equally important) topics to take. Furthermore, because the classes were taught every other year, it was difficult for some students to schedule the required classes, so in practice some students would have to substitute classes. With one (or more) of these classes being taught every semester, students will be able to fulfill their requirements in a timely fashion.

Program Requirements:
(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson George Hadjipa Date 3/11/2010

Dean of College_____ Date_____

Chairperson, College Curriculum Committee_____ Date_____

Chairperson, Senate Com. on UG or GR Studies_____ Date_____

Chairperson, Senate Coordinating Com._____ Date_____

Secretary, Faculty Senate_____ Date_____

Date of Senate Resolution_____ Date to be Effective_____

Registrar _____ Program Code_____ Date_____

Vice Provost for Academic Affairs & International Programs_____ Date_____

Provost _____ Date_____

Board of Trustee Notification_____ Date_____

Revised 02/09/2009 /khs

Current Version

DEGREE: BACHELOR OF SCIENCE MAJOR: PHYSICS CONCENTRATION: ASTRONOMY/ASTROPHYSICS

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade C-). 3

First Year Experience (see page 68). 0-4

Discovery Learning Experience (see page 68). 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) 3

COLLEGE REQUIREMENTS

Writing: (minimum grade C-). 3

A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated in the semester's Registration Booklet. (See list of courses approved for second writing requirement, pages 93-95.)

BREADTH REQUIREMENTS (See pages 95-100)

A total of eighteen credits from Groups A, B and C is required with a minimum of six credits in each group. 18

The six credits from each group could be from the same area.

Group A: Understanding and appreciation of the creative arts and humanities.

Group B: The study of culture and institutions over time.

Group C: Empirically based study of human beings and their environment.

MAJOR REQUIREMENTS

Ordinarily, no more than four credits from among PHYS 201 and 207 may be counted toward graduation requirements; similarly no more than four from among PHYS 202, 208. Students interested in majoring in Physics who have taken an introductory sequence other than PHYS 207/208 should consult with a member of the Physics faculty to consider the need for additional introductory courses, for which some additional credit toward graduation may be given with permission of the Physics chair.

All 200-level PHYS courses used to satisfy prerequisites or graduation requirements must be passed with a minimum grade of C-.

PHYS 169 Perspectives: Physics & Astronomy. 1

PHYS 207/208 Fundamentals of Physics I and II. 8

PHYS 211 Oscillations and Waves. 3

PHYS 309 20th/21st Century Physics. 3

PHYS 313 Physical Optics. 4

PHYS 333 Fundamentals of Astrophysics. 3

PHYS 419 Classical Mechanics I . . . . . .

PHYS 424 Quantum Mechanics. 3

PHYS 449 Introduction to Research. 3

PHYS 460 Computational Methods of Physics 3

PHYS 469 Observational Astronomy. 3

PHYS 632 Astrophysics. 3

PHYS 633 Stellar Astrophysics. 3

MATH 241/242/243 Analytic Geometry and Calculus A, B and C 12

Additional Credits of Physics or Math at or above the 300 level 12

One of the following. 6

MATH 302/349 Ordinary Differential Equations and Elementary Linear Algebra
MATH 341/342 Differential Equations with Linear Algebra

One of the following. 3-4

PHYS144 Concepts of the Universe /PHYS145 Blacks Holes and Cosmic Evolution/
PHYS133 Introduction to Astronomy

Foreign Language or Computer Science: 0-12

Completion of the intermediate-level course (107 or 112) in a given foreign language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

or

Completion of the following Computer Science sequence:

CISC 105 General Computer Science. 3

CISC 181 Introduction to Computer Science 3

CISC 220 Data Structures. 3

Additional credits of Computer Science at or above the 260 level 3

ELECTIVES
After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF. 124

Proposed Version

DEGREE: BACHELOR OF SCIENCE MAJOR: PHYSICS CONCENTRATION: ASTRONOMY/ASTROPHYSICS

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade C-). 3

First Year Experience (see page 68). 0-4

Discovery Learning Experience (see page 68). 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) 3

COLLEGE REQUIREMENTS

Writing: (minimum grade C-). 3

A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated in the semester's Registration Booklet. (See list of courses approved for second writing requirement, pages 93-95.)

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The six credits from each group could be from the same area.

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PHYS 207/208 Fundamentals of Physics I and II. 8

PHYS 211 Oscillations and Waves. 3

PHYS 309 20th/21st Century Physics. 3

PHYS 310 Introduction to thermal physics...3

PHYS 313 Physical Optics. 4

PHYS 333 Fundamentals of Astrophysics. 3

PHYS 419 Classical Mechanics I . . . . . .

PHYS 424 Quantum Mechanics. 3

PHYS 449 Introduction to Research. 3

PHYS 460 Computational Methods of Physics 3

PHYS 469 Observational Astronomy. 3

Two of the following 8 courses 6

PHYS434 Astrophysics and the Origins of Life

PHYS632 Astrophysics

PHYS633 Introduction to Stellar Astrophysics

PHYS634 Physics of the Sun

PHYS635 Space Physics

PHYS630 Galaxies

PHYS639 Selected topics in Astrophysics

PHYS644 Elementary Particles and Big Bang Cosmology

MATH 241/242/243 Analytic Geometry and Calculus A, B and C 12

One of the following. 6

MATH 302/349 Ordinary Differential Equations and Elementary Linear Algebra
MATH 341/342 Differential Equations with Linear Algebra

Additional Credits of Physics or Math at or above the 400 level 12

~~One of the following. . . . . 3-4~~

~~PHYS144 Concepts of the Universe /PHYS145 Blacks Holes and Cosmic Evolution/ PHYS133 Introduction to Astronomy~~

Foreign Language or Computer Science: 0-12

Completion of the intermediate-level course (107 or 112) in a given foreign language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

or

Completion of the following Computer Science sequence:

CISC 106 General Computer Science. 3

CISC 181 Introduction to Computer Science 3

CISC 220 Data Structures. 3

Additional credits of Computer Science at or above the 260 level 3

ELECTIVES

After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF. 124