LETTER OF NOTIFICATION – 11

RECONFIGURATION OF EXISTING DEGREE PROGRAMS

(Consolidation or Separation of Degrees to Create New Degree)

1. Institution submitting request: University of Arkansas Fayetteville
2. Contact person/title: Dr. Terry Martin, Vice Provost for Academic Affairs

(479) 575-2151/tmartin@uark.edu

1. Title(s) of degree programs to be consolidated/reconfigured: Physics Doctor of Philosophy with a concentration in Space and Planetary Sciences
2. Current CIP Code(s)/Current Degree Code(s): 40.0801/7350
3. Proposed title of consolidated/reconfigured program: Physics Doctor of Philosophy with concentrations in Astrophysics, Biophysics, and Neuroscience
4. Proposed CIP Code for new program: 40.0801
5. Proposed Effective Date: Fall 2018
6. Reason for proposed program consolidation/reconfiguration:

[Indicate student demand, (projected enrollment) for the proposed program and document that the program meets employer needs]

Reconfiguration of the Physics PhD program contains five major elements: (a) reduce the number of required courses, (b) add Biophysics concentration, (c) add Neuroscience concentration, (d) add Astrophysics concentration, and (e) delete Space and Planetary Sciences concentration. Making these changes will allow our PhD students to get involved in research more quickly, current and future students will be given the opportunity to have the name of their concentration (Biophysics, Neuroscience, or Astrophysics) printed on their transcripts, which will help them meet specific job requirements. Finally, the PhD in Physics with a concentration in Space and Planetary Sciences is no longer needed (a separate LON 5 has been submitted to delete the concentration).

We have 10-20 new PhD students enter our program each year. The employers that responded to our survey are: Pennsylvania State University, Instituto de Astrofisica, Pontificia Universidad Catolica de Chile, NASA Goddard Space Flight Center, Texas Tech University, University of British Columbia, University of Toronto, University of Urbana-Champaign, University of Cincinnati College of Medicine, Imperial College London, and Washington University, St. Louis. The list of current job titles for the proposed degree/certificate program are: Postdoctoral researcher, research associate, professor, chief scientist, instructor, postdoctoral fellow, research scientist, technician, and graduate student. The degree/certificate required for each job title is: Physics PhD with Biophysics Concentration, Physics PhD with Astrophysics Concentration, or Physics PhD with Neuroscience Concentration. The number of current positions for each job title is: 21 for Neuroscience, 111 for Biophysics, and 23 in Astrophysics. The number of future positions for each job title is: 24 for Neuroscience, 140 for Biophysics, and 88 in Astrophysics. The indicated salary for each job title is: $45,000-52,000 for Neuroscience, $25,000-48,000 for Biophysics, and $30,000-150,000 in Astrophysics.

1. Provide current and proposed curriculum outline by semester. Indicate total semester credit hours required for the proposed program. Underline new courses and provide new course descriptions. (If existing courses have been modified to create new courses, provide the course name/description for the current/existing courses and indicate the related new/modified courses.) Identify required general education core courses with an asterisk.

**Current Curriculum:**

PHYS 5011 Introduction to Current Physics Research Seminar

PHYS 5111 Research Techniques Through Laboratory Rotations

PHYS 5041 Journal Club Seminar

PHYS 5073 Mathematical Methods for Physics

PHYS 5413 Quantum Mechanics I

PHYS 5423 Quantum Mechanics II

PHYS 5313 Advanced Electromagnetic Theory I

PHYS 5323 Advanced Electromagnetic Theory II

PHYS 5103 Advanced Mechanics

PHYS 5213 Statistical Mechanics

PHYS 5263L Experiment and Data Analysis

At least thirteen credit hours of additional coursework chosen from the 5000/6000-level Physics courses listed in the Graduate School Catalog, and at least 18 hours of dissertation.

**Typical Program of Study (Ph.D. Students)**

1st Semester

PHYS 5011 Introduction to Current Physics Research Seminar

PHYS 5073 Mathematical Methods for Physics

PHYS 5413 Quantum Mechanics I

2nd Semester

PHYS 5111 Research Techniques Through Laboratory Rotations

PHYS 5041 Journal Club Seminar

PHYS 5423 Quantum Mechanics II

PHYS 5313 Advanced Electromagnetic Theory I

Summer I

PHYS 700V Doctoral Dissertation (6 hours)

3rd Semester

PHYS 5103 Advanced Mechanics

PHYS 5323 Advanced Electromagnetic Theory II

Electives

4th Semester

PHYS 700V Doctoral Dissertation

Electives

Subsequent Semesters and Summers

PHYS 5263L Experiment and Data Analysis

PHYS 700V Doctoral Dissertation

Electives

**Proposed Curriculum:**

PHYS 5011 Introduction to Current Physics Research Seminar

PHYS 5111 Research Techniques Through Laboratory Rotations

PHYS 5041 Journal Club Seminar

PHYS 5073 Mathematical Methods for Physics

PHYS 5413 Quantum Mechanics I

PHYS 5313 Advanced Electromagnetic Theory I

PHYS 5103 Advanced Mechanics

PHYS 5213 Statistical Mechanics

At least fifteen credit hours of additional coursework chosen from the 5000/6000-level Physics courses listed in the Graduate School Catalog, and at least 18 hours of dissertation. The doctoral degree will be awarded to students who complete a minimum of 72-graduate semester credit hours beyond the bachelor's degree. Students should also be aware of Graduate School requirements with regard to [doctoral degrees](https://nextcatalog.uark.edu/graduatecatalog/degreerequirements/#phdandedddegreestext).

**Typical Program of Study (Ph.D. Students)**

1st Semester

PHYS 5011 Introduction to Current Physics Research Seminar

PHYS 5073 Mathematical Methods for Physics

PHYS 5413 Quantum Mechanics I

2nd Semester

PHYS 5111 Research Techniques Through Laboratory Rotations

PHYS 5041 Journal Club Seminar

PHYS 700V Doctoral Dissertation

PHYS 5313 Advanced Electromagnetic Theory I

Summer I

PHYS 700V Doctoral Dissertation (6 hours)

3rd Semester

PHYS 5103 Advanced Mechanics

PHYS 700V Doctoral Dissertation

Electives

4th Semester

PHYS 700V Doctoral Dissertation

Electives

Subsequent Semesters and Summers

PHYS 700V Doctoral Dissertation

Electives

As part of the fifteen credit hour requirements noted above, Physics PhD students may choose one of the following concentrations by meeting its requirements: Astrophysics, Biophysics, or Neuroscience. Students who do not choose one of the three concentrations will pursue the general Physics PhD requirements by default.

Astrophysics Concentration

Physics Ph.D. with Astrophysics Concentration students must also take:

ASTR 5033 Astrophysics I: Planets and Stars

ASTR 5043 Astrophysics II: Galaxies and Cosmology

Nine (9) additional hours in elective coursework appropriate to the student’s field of specialization and approved by the student’s research thesis advisory committee.

Biophysics Concentration

Physics Ph.D. with Biophysics Concentration students must also take:

BIOL 5313 Molecular Cell Biology

PHYS 5613 Introduction to Biophysics and Biophysical Techniques

Nine (9) additional hours in elective coursework appropriate to the student’s field of specialization and approved by the student’s research thesis advisory committee.

Neuroscience Concentration

Physics Ph.D. with Neuroscience Concentration students must also take:

BIOL 4793 Intro to Neurobiology

PSYC 4183 Behavioral Neuroscience

Nine (9) additional hours in elective coursework appropriate to the student’s field of specialization and approved by the student’s research thesis advisory committee.

1. Provide program budget. Indicate amount of funds available for reallocation.   
   No new funds are being requested because the curriculum needed for each of the new concentrations already exists in the current budget for the 20 faculty teaching within the Physics PhD program. The current annual budget for the 20 faculty is $1,936,256.00, however this figure supports teaching, research, and service.
2. Provide current and proposed organizational chart.

Current Organizational Chart

College of Arts & Sciences

Department of Physics

Physics PhD

Space and Planetary Sciences concentration

Proposed Organizational Chart

Neuroscience concentration

Astrophysics concentration

Biophysics concentration

Physics PhD

Department of Physics

College of Arts & Sciences

1. Institutional curriculum committee review/approval date: September 13, 2017
2. Are the existing degrees offered off-campus or via distance delivery? No
3. Will the proposed degree be offered on-campus, off-campus, or via distance delivery? If yes, indicate mode of distance delivery. On-campus only
4. Provide documentation that proposed program has received full approval by licensure/certification entity, if required. (A program offered for teacher/education administrator licensure must be reviewed/approved by the Arkansas Department of Education prior to consideration by the Coordinating Board; therefore, the Education Protocol Form also must be submitted to ADHE along with the Letter of Notification).
5. Provide copy of e-mail notification to other institutions in the area of the proposed program.
6. List institutions offering similar program and identify the institution(s) used as a model to develop the proposed program.

The physics department benchmarks itself with the following peer National Universities: University of Mississippi, Louisiana State University, Kansas State University, University of Kansas, University of Oklahoma, University of Nebraska – Lincoln, and the University of Missouri. None of these universities utilize concentrations to help the marketability of their students.

1. Provide scheduled program review date (within 10 years of program implementation).  
   The next scheduled program review is 2021-2022.
2. Provide additional program information if requested by ADHE staff.

President/Chancellor Approval Date: November 6, 2017

Board of Trustees Notification Date: January 25, 2018

Chief Academic Officer: James S. Coleman Date: October 30, 2017

**Employer Needs Survey Form Institutional Summary**

**(Please compile the data from each Employer Needs Survey and submit the data on this Summary Form. Return the summary form and a copy of each survey form to ADHE with your program proposal.)**

Proposed Degree/Certificate Program: **\_\_\_\_\_Physics, PhD\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Institution: \_University of Arkansas, Fayetteville, AR\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name: \_\_Paul Thibado\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E-mail: \_\_\_thibado@uark.edu\_\_\_\_\_\_\_\_\_\_

(person completing this form)

List names of employers responding to survey:

Pennsylvania State University, Instituto de Astrofisica, Pontificia Universidad Catolica de Chile, NASA Goddard Space Flight Center, Texas Tech University, University of British Columbia, University of Toronto, University of Urbana-Champaign, University of Cincinnati College of Medicine, Imperial College London, Washington University, St. Louis

List current job titles for the proposed degree/certificate program:

Postdoctoral researcher, research associate, professor, chief scientist, instructor, postdoctoral fellow, research scientist, technician, graduate student,

List the degree/certificate required for each job title:

Physics PhD with Biophysics Concentration, Physics PhD with Astrophysics Concentration, or Physics PhD with Neuroscience Concentration

Indicate number of current positions for each job title:

21 for Neuroscience, 111 for Biophysics, 23 in Astrophysics

Indicate number of future positions for each job title:

24 for Neuroscience, 140 for Biophysics, 88 in Astrophysics

Indicate salary for each job title:

$45,000-52,000 for Neuroscience, $25,000-48,000 for Biophysics, $30,000-150,000 in Astrophysics

Indicate number of employers who gave preference for:   
on-line/distance technology: \_\_\_\_3\_\_\_\_\_\_\_\_\_\_\_\_\_

evenings: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3\_\_\_\_\_\_\_\_\_\_\_\_\_

weekends: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3\_\_\_\_\_\_\_\_\_\_\_\_\_

at company site: \_\_\_\_\_\_\_\_\_\_\_\_\_1\_\_\_\_\_\_\_\_\_\_\_\_\_

Indicate any type of support employers will give for support of the proposed degree/certificate program.

Hosting students.

Summarize the skills needed for employment in the positions listed.

Interpersonal communication, written/oral communication, team work, independent worker, computer programming, leadership/initiative, planning/organizing, problem solver, computer applications, budgeting, data analysis, public speaking, and PowerPoint presentations.

Summarize any additional information provided by prospective employers. None.