

**EXECUTIVE COMMITTEE
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES
REPORT TO THE RIVERSIDE DIVISION
May 26, 2020**

To be adopted:

Proposed changes to the B.A and B.S. in Physics

PRESENT:

PROPOSED:

Major Requirements

The major requirements consist of a core curriculum and additional requirements for various B.S. degrees. The core requirements for the B.A. and B.S. degrees in Physics are as follows:

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| 1. Lower-division requirements (70 units) | 1. (No Change) |
| a) one of the following sequences: PHYS 041A, PHYS 041B, PHYS 041C, or PHYS 040A or PHYS 40HA, PHYS 040B or PHYS 40HB, PHYS 040C or PHYS 40HC, PHYS 040D, PHYS 040E. The first sequence is preferred for the B.S. in Physics. | a) (No Change) |
| b) PHYS 039 | b) (No Change) |
| c) MATH 007A or MATH 009A or MATH 09HA, MATH 007B or MATH 009B or MATH 09HB, MATH 009C, MATH 010A, MATH 010B, MATH 046 | c) (No Change) |
| d) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC | d) (No Change) |
| e) CS 010. A higher-level CS course may satisfy the CS 010 requirement with approval. | e) <u>CS 010A or CS 009P.</u> A higher-level CS course may satisfy this CS requirement with approval. |
| 2. Upper-division requirements (41 to 42 units) | 2. (No Change) |
| a) PHYS 130A, PHYS 130B, PHYS 132, PHYS 135A, PHYS 135B, PHYS 156A, PHYS 156B | a) (No Change) |

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| b) PHYS 139L (5 units), PHYS 142L (4 units) or PHYS 142W (5 units). Note that PHYS142W satisfies the ENGL 1C requirement. | b) (No Change) |
| c) 4 units of upper division Physics electives. Upper division math, science or engineering may be substituted with approval. | c) (No Change) |

Physics: Standard Track (B.S. degree)

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| 1. Additional upper-division requirements (16 to 17 units) | 1. (No Change) |
| a) PHYS 136 | a) (No Change) |
| b) One of the following: one additional quarter of PHYS 142L (4 units) or PHYS 142W (5 units); at least 4 units of Senior Thesis (PHYS 195A, PHYS 195B, PHYS 195C, PHYS 195D); at least 4 units of Internship in Physics (PHYS 198I); participation in an approved summer research program, such as a NSF REU, and an additional 4 units of upper division physics elective. | b) (No Change) |
| c) 8 additional units of upper division Physics electives. PHYS 156C is highly recommended for those planning to go to graduate school in physics. | c) (No Change) |

Physics: Biophysics Track (B.S. degree)

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| 1. Additional lower-division requirements (25 units) | 1. (No Change) |
| a) BIOL 005A, BIOL 005B, BIOL 005C, BIOL 05LA or BIOL 020. | a) (No Change) |
| b) CHEM 008A, or CHEM 08HA, CHEM 008B or CHEM 08HB, CHEM 008C or CHEM 08HC, CHEM 08LA or CHEM 08HLA, CHEM 08LB or CHEM 08HLB, CHEM 08LC or CHEM 08HLC | b) (No Change) |

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| 2. Additional upper-division requirements (8 units) | 2. (No Change) |
| a) 8 additional upper-division units taken from BCH 110A, BCH 110B, BCH 110C or BIOL 107A (other upper division CHEM/BIOL/BCH may be substituted upon approval) | a) (No Change) |

Physics Education Track (B.S. degree ~~only~~)

Physics Education Track (B.S. degree)

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| 1. Additional lower-division requirements (6 units) | 1. (No Change) |
| a) EDUC 003, EDUC 004 | a) (No Change) |
| 2. Additional upper-division requirements (8 units) | 2. (No Change) |
| a) Choose two courses from the following list: EDUC 105 (highly recommended), EDUC 147, EDUC 162, EDUC 132, EDUC 178 or EDUC 177, EDUC 179A | a) Choose two courses from the following list: EDUC 105 (highly recommended); EDUC 147, EDUC 162, EDUC 132, EDUC 177, EDUC 179A |

Physics: Applied Physics and Engineering Track (B.S degree)

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| 1. 16 additional units of approved Engineering electives including a minimum of 8 units at the upper-division level. A list of approved CS, EE, ME, CEE, CHE, and BIEN courses is available upon request from your physics faculty academic advisor or your advisor in the CNAS Advising Center. Example course plans can be found in the department web pages. | 1. (No Change) |
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Students continuing on to graduate school are encouraged to take additional upper-division courses in Mathematics, such as MATH 146A, MATH 146B, MATH 146C, MATH 165A, MATH 165B, and MATH 131.	(No Change)
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Students may wish to earn a Minor in Mathematics which requires an additional 24 units of upper division math.	(No Change)
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To graduate, a minimum grade point average of	(No Change)
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2.00 (C) is necessary overall and in the upper-division courses taken for the major (courses listed under 2.).

Justification:

1. This is a new document of undergraduate program changes, including updates subsequent to the proposal approved at the December 3, 2019 Division meeting.
2. Justification: The new CS 009P course is "Introduction to Programming" and is taught using the python programming language. The CS 010 (renumbered to CS 010A) course is "Introduction to Computer Science for Science, Mathematics, and Engineering" and is taught using the C++ programming language. The python programming language is now widely used in physics research. It is also easier to learn than C++ and does not require specialized tools to compile and run the source code. We would like to give our physics majors the option to learn programming in python as an alternative to C++.
3. The GSOE changed several EDUC course numbers, so we need to update the text for the physics major Physics Education Track.

Approvals:

Approved by the faculty of the Department of Physics and Astronomy:	March 19, 2019
Approved by the Executive Committee of the College of Natural and Agricultural Sciences Executive Committee:	January 14, 2020
Approved by the Committee on Educational Policy:	April 15, 2020