TO: The Academic Senate
FROM: Committee on Instruction and Curriculum (CIC)
SUBJECT: 16-17 CIC 44: Revision request for minor in Physics
PURPOSE: Information to the Academic Senate
ACTION REQUESTED: That the Senate accept the information that the revision request for the minor in Physics has been approved by CIC.

BACKGROUND INFORMATION:
The Senate process for approving transformed degree programs for the semester calendar is defined by 14-15 CIC 36. The Committee discussed the Physics minor program at its November 28 meeting, which was attended by a representative of the Department: Derek Kimball. It was approved by CIC unanimously with the acknowledgement that some non-substantive changes may occur in the Catalog copy. The proposal may be viewed within Curriculog; the summary is attached as a PDF document per ExCom’s request.
Minor in Physics

4. Semester Conversion Request for Approval of New or Modified Minor

General Catalog Information

Select Program unless otherwise instructed by APGS

Select PROGRAM

- Program
- Shared Core

Action Requested

- New Minor
- Revision of Minor (Direct Conversion)
- Revision of Minor (Transformation)

Year: Fall 2018

Catalog: 2018-2019

Department: Department of Physics

Full and exact title of Minor: Minor in Physics

Has your program received transformation funding? Yes

If the program received transformation funding, please summarize the transformative change made:
The lower division introductory coursework (PHYS 135, 136 and 137) was transformed from four five-unit quarter courses into the three four-unit semester courses. One of the over-arching themes in our transformed major is that the curriculum now includes more hands-on laboratory coursework and we have transformed the labs to include more high impact practice and a focus on developing laboratory skills. For instance, the labs accompanying the lower division introductory coursework were transformed to include inquiry-based learning methodologies and a focus on mastery of important lab-skills (e.g., ability to design an experiment, record, analyze and plot data and apply appropriate error analysis methods) by the end of the sequence.

A focus of the upper division experience for a Physics minor will be the upper division lab PHYS 380. The upper division lab will allow students to develop mastery in both electronics and experimental techniques. Physics minors will learn sound scientific practices and the Advanced Lab experience will provide scaffolded integration of project-based learning.

We have also decided to place a strong emphasis on “Writing across the curriculum.” We have transformed our major to include a second semester, sophomore year course (to be taken upon completion of the three semester introductory Physics sequence) PHYS 230 – Physical Reasoning. This course will focus on the elements of sound physical reasoning as expressed through clear scientific writing. Students will write detailed solutions to challenging problems, summaries of research articles, and reviews of important topics of physics. Students will be introduced to techniques to solve non-analytic problems, i.e. computational methods. We expect that this course will satisfy the Writing II/Writing-in-the-Discipline University requirement.

The Physics program will also now include a wider array of elective courses (Atomic, Condensed Matter, Particle and Astrophysics) compared to under the quarter system as the department faculty’s areas of expertise now covers the latter two areas.

**Minor Requirements (24 units)**

The minor in physics is designed to provide a general background for students majoring in other areas. It is of particular value to students majoring in such sciences as biology, chemistry, computer science, environmental
science, geology, and mathematics. However the minor provides a breadth of study beneficial to all students interested in the being able to critically analyze the physical word around them. A minor in physics will broaden students' understanding of physical science and will expand employment opportunities, including teaching at the secondary school level. The minor consists of a minimum of 24 units.

**Required Courses (11-15 units)**

PHYS 230 Physical Reasoning  
And choose one (1) group from the following:  
PHYS 125 Principles of Physics I  
PHYS 126 Principles of Physics II  
or  
PHYS 135 Physics for Scientists and Engineers I  
PHYS 136 Physics for Scientists and Engineers II  
PHYS 137 Physics for Scientists and Engineers III

**Elective Courses**

A minimum of 24 units are required for the minor. There is a nine (9) unit minimum required of upper division coursework for the minor.

PHYS 104 Musical Acoustics  
PHYS 105 How Things Work  
PHYS 106 Physics for Future Leaders  
PHYS 107 Science of Energy  
PHYS 108 Astronomy of Ancient Cultures  
PHYS 115 Elementary Physics  
PHYS 307 Social Impact Through Sustainable Solar Design  
PHYS 330 Analytic Mechanics  
PHYS 340 Statistical Mechanics and Thermodynamics  
PHYS 350 Quantum Mechanics I  
PHYS 351 Quantum Mechanics II  
PHYS 380 Advanced Laboratory I - Electronics  
PHYS 381 Advanced Laboratory II  
PHYS 450 Electromagnetism I  
PHYS 451 Electromagnetism II  
PHYS 460 Astrophysics  
PHYS 461 Atomic Physics  
PHYS 462 Particle Physics  
PHYS 463 Solid State Physics  
PHYS 480 Advanced Laboratory III
Additional Notes/Information:

Please indicate which (if any) Minors have been discontinued:

Resource implications of the proposed revision, if any:

None.

Relationship of Revised Program to requirements for teaching credentials, accreditation, and/or licensing, if any:

Consultation with other affected departments and programs:

The following department(s) has (have) been consulted and
raised no objections: None.

The following department(s) has (have) been consulted and raised concerns:

None.

Catalog Item Types

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# Steps for Minor in Physics

## Originator

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| ✔ Derek Jackson Kimball 1/19/2016 5:33 PM | Required for Approval: 100% required  
Date Completed: 1/19/2016 5:33 PM  
Changes: No  
Comments: No |

## Department Chair

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| ✔ Erik Helgren 1/20/2016 8:00 AM | Required for Approval: 100% required  
Date Completed: 1/20/2016 8:00 AM  
Changes: No  
Comments: No |

## Dean's Office Review

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| ✔ Jason Singley 1/20/2016 9:07 AM | Required for Approval: 100% required  
Date Completed: 1/20/2016 9:07 AM  
Changes: No  
Comments: No |

## College Curriculum Committee Approval

Status: Approved
### Participants

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APGS (AVP Review)  
Status: Restarted

Participants
- Lindsay McCrea
- Donna Wiley
- Sarah Aubert (System Administrator)  
4/21/2016 11:47 AM

Activity
- Required for Approval: 100% required
- Date Completed: 4/21/2016 11:47 AM
- Changes: No
- Comments: No

APGS (AVP Review)  
Status: Routed

Participants
- Donna Wiley  8/3/2016 11:06 AM
- Stephanie Matsuda (System Administrator)  8/3/2016 11:13 AM

Activity
- Required for Approval: 100% required
- Date Completed: 8/3/2016 11:13 AM
- Changes: No
- Comments: Yes

Custom Route  
Status: Approved

Participants
- Erik Helgren  8/19/2016 12:12 PM

Activity
- Required for Approval: 100% required
- Date Completed: 8/19/2016 12:12 PM
- Changes: No
- Comments: No

APGS (AVP Review)  
Status: Rejected

Participants
- Donna Wiley  8/19/2016 1:07 PM

Activity
- Required for Approval: 100% required
- Date Completed: 8/19/2016 1:07 PM
- Changes: No
- Comments: Yes
# APGS (Technical Review)

**Participants**
- Sarah Aubert  
  8/19/2016 1:38 PM  
- Sandra Claflin  
  8/19/2016 1:40 PM  
- Stephanie Matsuda  
  8/19/2016 1:30 PM  
- Sarah Aubert (System Administrator)  
  8/19/2016 1:15 PM

**Activity**
- Required for Approval: 100% required
- Date Completed: 8/19/2016 1:40 PM
- Changes: No
- Comments: Yes

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# Custom Route

**Participants**
- Erik Helgren  
  9/2/2016 9:45 AM

**Activity**
- Required for Approval: 100% required
- Date Completed: 9/2/2016 9:45 AM
- Changes: No
- Comments: No

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# APGS (AVP Review)

**Participants**
- Donna Wiley  
  9/16/2016 3:23 PM

**Activity**
- Required for Approval: 100% required
- Date Completed: 9/16/2016 3:23 PM
- Changes: No
- Comments: Yes

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# Committee on Instruction and Curriculum

**Status:** Restarted
**Committee on Instruction and Curriculum**  
**Participants**  
- **CIC**  
  - Mitch Watnik *  
  - Additional Participants  
  
**Activity**  
- Required for Approval:  
  - 100% required  
- Date Completed:  
  - 10/17/2016 1:35 PM  
- Changes: No  
- Comments: No  
- Agenda: Yes  
  
* Agenda Administrator

**Executive Committee**  
**Participants**  
- **ExCom**  
  - Mark Karplus *  
  
**Step Details**  
- Required for Approval:  
  - 100% required  
- Work: comment  
- Agenda: Yes  
  
* Agenda Administrator

**Academic Senate**  
**Participants**  
- Michael Hedrick  
  
**Step Details**  
- Required for Approval:  
  - 100% required  
- Work: comment
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Attachments for Minor in Physics

This proposal does not have any attachments.
Comments for Minor in Physics

Donna Wiley
9/16/2016 3:23 pm
I suggest adding (9-13 units) in the heading of the Electives section - this can be done in final tech review.

Sarah Aubert
8/19/2016 1:14 pm
Routing to Erik for corrections to text in electives section.

Donna Wiley
8/19/2016 1:07 pm
I'm rejecting on request of the department chair to made additional edits.

Donna Wiley
8/3/2016 11:06 am
Please see email with comments for the Astronomy Minor. The same revisions are needed for the Physics Minor -- your current Minor is an example of what is needed.

Anne Kotchevar
1/22/2016 8:25 am
Approved unanimously by the College of Science Curriculum committee.

Decision Summary for Minor in Physics

Committee on Instruction and Curriculum

Step Summary
This step requires 100% approval from all participants to move forward.

Participants

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▲ CIC

CIC Nov. 28

MITCH WATNIK *