

Program Change Request

Date Submitted: 01/27/23 4:39 pm

Viewing: **SC-BS-PHYS : Physics, BS**

Last approved: 03/10/21 9:40 am

Last edit: 03/29/23 4:27 pm

Changes proposed by: prubin

[Physics, BS](#)

Catalog Pages Using this Program

No Longer Anticipated closure
 date (i.e. calendar)
 Rationale for

Are you completing this form on someone else's behalf?
 No

Effective Catalog: 2023-2024

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Physics, BS

Approval Criteria

1. What was the process used within your academy?
2. Who was involved in approving the badge?
3. What evidence was used to identify need/demand?
 - a. Have you ensured there are no other existing badges?
 - b. Has CPE confirmed the proposed badge does not duplicate existing content?
 - c. Has the instructor(s) for this badge experience been documented?
 - d. Is there a contact hour minimum?
 - e. Is an assessment required?
 - f. Does this badge provide a benefit for current or future students?
5. Is this badge co-sponsored with another organization, association, or unit? (If you would like an assessment, please provide details.)
 - a. What is the organization, program, or department name?

Earning Criteria

Course:
 Badge:
 Participant:
 Document:
 Portfolio:
 Presentation:
 Assessment:

- ### In Workflow
1. **PHYS UG Committee**
 2. **PHYS Chair**
 3. **SC Curriculum Committee**
 4. SC Associate Dean
 5. Assoc Provost-Undergraduate
 6. Registrar-Programs

- ### Approval Path
1. 03/03/23 6:07 pm
Philip Rubin (prubin): Approved for PHYS UG Committee
 2. 03/04/23 11:51 am
Paul So (paso): Approved for PHYS Chair

- ### History
1. Nov 17, 2017 by clmig-jwehrheim
 2. Feb 20, 2018 by rzachari
 3. Mar 6, 2018 by Jennifer Bazaz Gettys (jbazaz)
 4. Mar 8, 2018 by Jennifer Bazaz Gettys (jbazaz)
 5. Oct 23, 2019 by Philip Rubin (prubin)
 6. Sep 21, 2020 by Philip Rubin (prubin)

7. Jan 29, 2021 by
Philip Rubin
(prubin)

8. Mar 10, 2021 by
jriemen

Credential Education
Other Project Professional
Schedule/Registration:
Volunteer:
Skills Tag

Skills Tag
Badge Attributes
Please select one from each category:

Achievement Type:
Mastery Level:
Time Commitment:
Cost:
Industry Standards:
Recommendations:

Issuance information and Pricing

Pricing: See <https://coe.amu.edu/digitalbadgespricing/> for more information.

Estimated Number of Badges Expected to be Issued:

Notes:

- All badge requests will be routed to CPE for review and approval. Please allow 7
- A Mason Digital Credentials Advisory Group may be developed to review badge

Banner Title: Physics, BS

Is this a retitling of an existing program?

Existing Program

Registrar/OAPI Use Only – SCHEV Status Approved

Registrar’s Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Registrar/OAPI Use Only – SACSCOC Status

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Applied and Engineering Physics	PHAE
2	Astrophysics	PHAP

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
3	Computational Physics	PHCP
<p>INTO Major(s)</p> <p>Registrar/IRR Use Only – Concentration CIP Code</p> <p>College/School: College of Science</p> <p>Department / Academic Unit: Physics & Astronomy</p> <p>Jointly Owned Program? No</p> <p>Participating</p> <p>Participating</p> <p>Justification</p> <p>What: Modify core requirements (drop PHYS 308 and 416 from core requirements; add PHYS 170, 270 and 262 to core requirements; add PHYS 308 to list of no-concentration major electives--this results in one fewer credit for the major); improve some text:</p> <ol style="list-style-type: none"> 1) add 170/270 as alternative to 160/260 introductory sequence 2) improve preparation for upper-division courses: PHYS 262 (an established course now offered every semester) includes thermodynamics and modern physics; PHYS 308 (offered only once a year) includes only modern physics; note that PHYS 170/270 include some thermodynamics and modern physics, so students who chose that series receive even better preparation. 3) more closely parallel core preparation at NVCC and other programs whose students transfer in: the NVCC PHY 241, 242, 243 sequence. for example, maps closely to GMU's PHYS 160, 260 (or 170, 270), 262 4) PHYS 416 is no longer necessary: fewer graduating students are taking the PHYS GRE, as ever fewer programs require it; an alternative assessment procedure is under development 5) The sentence, "Not all applicants who meet the minimum requirements are guaranteed acceptance," to the departmental honors blurb in the catalog after it was noticed that many if not most other programs include it. 6) Extend credit exceptions for second majors to second bachelor's degrees. 		

Catalog Published Information

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code:

SC-BS-PHYS

Registrar/IRR Use Only – Program CIP Code 40.0801 - Physics, General.

Admission
Requirements:

Admissions

University-wide admissions policies can be found in the [Undergraduate Admissions Policies](#) section of this catalog. To apply for this program, please complete the [George Mason University Admissions Application](#).

Program-Specific
Policies:

Policies

Students must fulfill all [Requirements for Bachelor's Degrees](#) including the [Mason Core](#).

The intensive writing requirement is fulfilled by taking [PHYS 407](#) Senior Laboratory in Modern Physics ([Mason Core](#)), [PHYS 410](#) Computational Physics Capstone ([Mason Core](#)), or [ASTR 402](#) RS: Methods of Observational Astronomy ([Mason Core](#)), which are also capstone courses for the major.

For policies governing all undergraduate programs, see [AP.5 Undergraduate Policies](#).

Double Majors

Students considering a double major with physics should discuss this option with the respective undergraduate coordinators. Note that at least 18 credits used to fulfill the Physics, BS cannot be used to fulfill another major or minor. Some course substitutions are allowed for double majors, but these should be discussed with a physics advisor in advance.

Alternative Introductory Sequence

Normally, students who intend to major in physics should **begin with one of** ~~take~~ the physics introductory **sequences:**
sequence:

PHYS 160	University Physics I (Mason Core)	4
& PHYS 161	and University Physics I Laboratory (Mason Core)	
PHYS 161	University Physics I Laboratory (Mason Core)	1
PHYS 260	University Physics II (Mason Core)	4
& PHYS 261	and University Physics II Laboratory (Mason Core)	
PHYS 261	University Physics II Laboratory (Mason Core)	1
Or		
PHYS 170	Introductory and Modern Physics I (Mason Core)	4
& PHYS 161	and University Physics I Laboratory (Mason Core)	
PHYS 270	Introductory and Modern Physics II (Mason Core)	4
& PHYS 261	and University Physics II Laboratory (Mason Core)	

Students who decide to major in physics after completing [PHYS 243](#) College Physics I ([Mason Core](#)), [PHYS 244](#) College Physics I Lab ([Mason Core](#)), [PHYS 245](#) College Physics II ([Mason Core](#)) and [PHYS 246](#) College Physics II Lab ([Mason Core](#)) are welcome, but are required to obtain written permission from the [Department of Physics and Astronomy](#) before a change of major can be approved.

Degree Requirements:

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

Students must complete a **minimum total** of **74** ~~75~~ credits in the major (**68** ~~69~~ credits if completing a second major), including at least 11 credits in mathematics, with a **minimum minimum** GPA of 2.00.

Students must complete the coursework described below and either select a concentration or select the "BS without Concentration" option:

Physics Core Courses

Choose one of the following two sequences:

8

Sequence One

[PHYS 160](#) University Physics I ([Mason Core](#))

& [PHYS 161](#) and University Physics I Laboratory ([Mason Core](#)) (the lab can be taken with, or any time after, [PHYS 160](#))

~~[PHYS 161](#) University Physics I Laboratory ([Mason Core](#))~~

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[PHYS 260](#) University Physics II ([Mason Core](#))

& [PHYS 261](#) and University Physics II Laboratory ([Mason Core](#)) (the lab can be taken with, or any time after, [PHYS 260](#))

~~[PHYS 261](#) University Physics II Laboratory ([Mason Core](#))~~

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Sequence Two

[PHYS 170](#) **Introductory and Modern Physics I ([Mason Core](#))**

& [PHYS 161](#) and University Physics I Laboratory ([Mason Core](#)) (the lab can be taken with, or any time after, [PHYS 170](#))

[PHYS 270](#) **Introductory and Modern Physics II ([Mason Core](#))**

& [PHYS 261](#) and University Physics II Laboratory ([Mason Core](#)) (the lab can be taken with, or any time after, [PHYS 270](#))

[PHYS 251](#) Introduction to Computer Methods in Physics ([Mason Core](#))

3

[PHYS 262](#) **University Physics III ([Mason Core](#))**

3

[PHYS 301](#) Analytical Methods of Physics

3

[PHYS 303](#) Classical Mechanics

3

[PHYS 305](#) Electromagnetic Theory 1

3

[PHYS 307](#) Thermal Physics

3

~~[PHYS 308](#) **Modern Physics**~~

3

[PHYS 402](#) Introduction to Quantum Mechanics and Atomic Physics

3

~~[PHYS 416](#) **Undergraduate Physics Review**~~

±

Total Credits

29

1Students double majoring in engineering and physics may substitute [ECE 305](#) Electromagnetic Theory for [PHYS 305](#) Electromagnetic Theory.

Mathematics

[MATH 113](#) Analytic Geometry and Calculus I ([Mason Core](#))

4

[MATH 114](#) Analytic Geometry and Calculus II

4

[MATH 213](#) Analytic Geometry and Calculus III

3

Total Credits

11

BS without Concentration

Mathematics/Computational Physics

6

Select 6 credits from the following:

[MATH 203](#) Linear Algebra

MATH 214	Elementary Differential Equations	
PHYS 325	Intermediate Computer Methods in Physics	
Intermediate Laboratory		6
PHYS 311	Instrumentation	
PHYS 312	Waves and Optics	
Research, Internship, or Independent Study		3
Select 3 credits from the following:		
PHYS 326	Problems in Physics II	
PHYS 405	Honors Thesis in Physics I	
PHYS 406	Honors Thesis in Physics II	
PHYS 408	Senior Research	
PHYS 409	Physics Internship	
Capstone		4
PHYS 407	Senior Laboratory in Modern Physics (Mason Core)	1
PHYS 410	Computational Physics Capstone (Mason Core)	1
Physics Theory		9-15
All students complete the following 9 credits:		
PHYS 306	Wave Motion and Electromagnetic Radiation	
PHYS 403	Quantum Mechanics II	
PHYS 428	Relativity	
Only students who are not completing a second major or a second bachelor's degree must select 6 additional credits from the following:		
ASTR 210	Introduction to Astrophysics	
ASTR 328	Stars	
ASTR 403	Planetary Science	
ASTR 404	Galaxies and Cosmology	
PHYS 308	Modern Physics	
PHYS 331	Physics of Renewable Energy	
PHYS 370	Molecular Biophysics	
PHYS 412	Solid State Physics and Applications	
PHYS 440	Nuclear and Particle Physics	
PHYS 465	Planetary Atmospheres and Ionospheres	
PHYS 475	Atmospheric Physics	
Total Credits		28-34
1 Fulfills the writing intensive requirement.		

Applied and Engineering Physics Concentration (PHAE)

Mathematics/Computational Physics		3
PHYS 325	Intermediate Computer Methods in Physics	
Intermediate Laboratory		6
PHYS 311	Instrumentation	
PHYS 312	Waves and Optics	
Physics Theory		9
PHYS 306	Wave Motion and Electromagnetic Radiation	

Select 6 credits from the following:

PHYS 331	Physics of Renewable Energy
PHYS 370	Molecular Biophysics
PHYS 403	Quantum Mechanics II
PHYS 412	Solid State Physics and Applications

Capstone

4

Select 4 credits from the following:

PHYS 407	Senior Laboratory in Modern Physics (Mason Core) 1
PHYS 410	Computational Physics Capstone (Mason Core) 1

Practical Work

6-
12

Students who are not completing a second major or a second bachelor's degree should select 12 credits from the following. Students who are completing a second major or a second bachelor's degree should select 6 credits:

PHYS 405	Honors Thesis in Physics I
PHYS 406	Honors Thesis in Physics II
PHYS 408	Senior Research
PHYS 409	Physics Internship
BENG 320	Bioengineering Signals and Systems
ECE 415	Power System Analysis
ECE 416	Electric Machinery and Modern Applications

Or other approved 300 or 400-level Volgenau School of Engineering courses

Total Credits

28-
34

1 Fulfills the writing intensive requirement.

Astrophysics Concentration (PHAP)

Mathematics/Computational Physics

6

ASTR 401	Computer Simulation in Astronomy
MATH 214	Elementary Differential Equations

Intermediate Laboratory

6

PHYS 311	Instrumentation
PHYS 312	Waves and Optics

Research, Internship, or Independent Study

3

Select 3 credits from the following:

ASTR 405	Honors Thesis in Astronomy I
ASTR 406	Honors Thesis in Astronomy II
ASTR 408	Senior Research
ASTR 409	Astronomy Internship
PHYS 326	Problems in Physics II
PHYS 405	Honors Thesis in Physics I
PHYS 406	Honors Thesis in Physics II
PHYS 408	Senior Research
PHYS 409	Physics Internship

Capstone

4

Select 4 credits from the following:

[ASTR 402](#) RS: Methods of Observational Astronomy ([Mason Core](#)) 1

[PHYS 407](#) Senior Laboratory in Modern Physics ([Mason Core](#)) 1

[PHYS 410](#) Computational Physics Capstone ([Mason Core](#)) 1

Physics and Astronomy Theory

12-18

~~Students who are not completing a second major must complete the following:~~

Students who are not completing a second major or a second bachelor's degree must complete the following:

[ASTR 210](#) Introduction to Astrophysics

[ASTR 328](#) Stars

[PHYS 306](#) Wave Motion and Electromagnetic Radiation

[PHYS 428](#) Relativity

Select two courses from the following:

[ASTR 403](#) Planetary Science

[ASTR 404](#) Galaxies and Cosmology

[ASTR 420](#) Exoplanets

[ASTR 480](#) The Interstellar Medium

~~Students who are completing a second major must complete the following:~~

Students who are completing a second major or a second bachelor's degree must complete the following:

[ASTR 210](#) Introduction to Astrophysics

[ASTR 328](#) Stars

Select 3 credits from the following:

[PHYS 306](#) Wave Motion and Electromagnetic Radiation

[PHYS 428](#) Relativity

Select 3 credits from the following:

[ASTR 403](#) Planetary Science

[ASTR 404](#) Galaxies and Cosmology

[ASTR 420](#) Exoplanets

[ASTR 480](#) The Interstellar Medium

Total Credits

31-37

1 Fulfills the writing intensive requirement.

Computational Physics Concentration (PHCP)

Mathematics/Computational Physics

15

[PHYS 325](#) Intermediate Computer Methods in Physics

[MATH 203](#) Linear Algebra

[MATH 214](#) Elementary Differential Equations

Select 6 credits from the following:

[ASTR 401](#) Computer Simulation in Astronomy

[CDS 302](#) Scientific Data and Databases

[CDS 303](#) Scientific Data Mining

[MATH 446](#) Numerical Analysis I

[MATH 447](#) Numerical Analysis II

Intermediate Laboratory

3

[PHYS 311](#) Instrumentation

Research, Internship, or Independent Study

3

Select 3 credits from the following:

PHYS 326	Problems in Physics II
PHYS 405	Honors Thesis in Physics I
PHYS 406	Honors Thesis in Physics II
PHYS 408	Senior Research
PHYS 409	Physics Internship

Capstone

4

PHYS 410	Computational Physics Capstone (Mason Core) 1
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Physics and Astronomy Theory

3-9

Students who are not completing a second major or a second bachelor's degree must select 9 credits of the following.

Students who are completing a second major or a second bachelor's degree must select 3 credits from the following:

ASTR 210	Introduction to Astrophysics
ASTR 328	Stars
ASTR 403	Planetary Science
PHYS 306	Wave Motion and Electromagnetic Radiation
PHYS 412	Solid State Physics and Applications

Total Credits

28-

34

- 1 Fulfills the writing intensive requirement.

**Retroactive
Requirements
Updates:**

Plan of Study:

**Honors
Information:**

Honors in the Major

Physics majors who have maintained an overall GPA of at least 3.50 in physics courses and a GPA of 3.50 in all courses taken at George Mason University may apply to the physics honors program when they complete the first semester of their junior **year**.

Not all applicants who meet the minimum requirements are guaranteed acceptance. year:

To graduate with honors in physics, a student is required to maintain a minimum GPA of 3.00 in physics courses and successfully complete [PHYS 405](#) Honors Thesis in Physics I and [PHYS 406](#) Honors Thesis in Physics II with a GPA of at least 3.50 and a grade of at least 'A-' in [PHYS 406](#) Honors Thesis in Physics II. Please visit the department for details.

**Accelerated
Description/Dual
Degree
Description:**

**INTO-Mason
Requirements:**

**College
Requirements &
Policies:**

**Department /
Academic Unit
Requirements &
Policies:**

Program Outcomes

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

Indicate whether students are able

What is the primary delivery format for the program?
Face-to-Face Only

Does any portion of this program occur off-campus?

No

Off-campus details:

Are you working with a vendor / other collaborators to offer your program?

No

Please explain:

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Please explain:

Are you adding or removing a licensure component?

No

Please explain:

Additional SCHEV & SACSCOC Information

Is the content of the new program closely related to that of an existing approved program at the same instructional level (i.e., baccalaureate, master's, doctoral)?

Which existing approved program(s)?

Is this new program considered to be "advancing the degree level of a currently approved program" (i.e. existing content is at lower degree level, new content is at the higher degree level)?

Which existing approved program(s)?

Is this new program considered to be "lowering the degree level of a currently approved program" (i.e. existing content is at higher degree level, new content is at the lower degree level)?

Which existing approved program(s)?

Is this a re-opening of a program that was closed to admission within the last five years?

Date of Program Closure

What are the methods of delivery for the program?

Does this program include a course/credit-based competency-based education delivery option?

Is this change a simple retitling of an existing program, with no other changes, to any existing program content, curriculum requirements, etc?

No

Does this change represent a repackaging of content in an existing approved degree/certificate program at the same instructional level (i.e., baccalaureate, master's, or doctoral)?

No

Which existing approved program(s)?

Percentage of total credits containing new course content. ("New course content" is defined by SACSCOC as content that is not currently included in an existing approved degree/certificate program at the same instructional level. Do not exclude ge ed credits in calculations for undergraduate programs.)

0%-24%

Does this change include the addition of a distance education or face-to-face method of delivery for this program?

No

What is the new method of delivery?

Does this change include the addition of a course/credit-based competency-based education delivery option?

No

Will any additional equipment/facilities be needed?

No

Description of institutional impact:

Will any additional faculty be required?

No

Description of institutional impact:

Will any additional financial resources be needed?

No

Description of institutional impact:

Additional library/learning resources needed?

No

Description of institutional impact:

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? No

Green Leaf Designation

Sustainability-focused academic programs require at least one green leaf course. Either that course is itself sustainability-focused or else the program requires a set of sustainability-related courses with aggregated substance equivalent to a sustainability focused course.

Relationship to Existing Courses

Relationship to Existing Programs

List sustainability-focused courses currently required in the degree

Sustainability-related academic programs either require at least one sustainability-related course or else offer any green leaf course as an option or elective.*

List sustainability-related courses currently required in the degree

Does this program cover material which crosses into another department?

No

Impacted Departments

Additional Attachments

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

[%wi_required.eshtml%](#)

Attached Document

[%attach_document.eshtml%](#)