Ollscoil na Gaillimhe
University of Galway

Bachelor of Science Degree
College of Science and Engineering
2024/2025

BSc PHYSICS

www.universityofgalway.ie/science-engineering/

Overview

Year 1	Year 2	Year 3	Year 4
[60 Credits]	**[60 Credits]**	**[60 Credits]**	**[60 Credits]**
Physics and Applied Physics: There are 30 credits of Core modules. Choose one module to a value of 15 credits: Mathematics (Honours) Mathematical Studies Choose one module to a value of 15 credits: Biology Applied Mathematics Chemistry **Physics with Astrophysics:** There are 45 credits of Core modules. Choose one module to a value of 15 credits: Mathematics (Honours) Mathematical Studies **Physics with Biomedical Physics:** There are 45 credits of Core modules. Choose one module to a value of 15 credits: Mathematics (Honours) Mathematical Studies **Physics and Climate Physics:** There are 45 credits of Core modules. Choose one module to a value of 15 credits: Applied Mathematics Mathematics (Honours) Mathematical Studies **Physics and Theoretical Physics:** There are 45 credits of Core modules. Choose one module to a value of 15 credits: Mathematics (Honours) Mathematical Studies	**Physics and Applied Physics:** There are 30 credits of Core modules. Choose 1 pathway to a total value of 20 credits: Mathematical Studies Mathematics Choose Electives to a value of 10 credits from the list available **Physics with Astrophysics:** There are 60 credits of Core modules. **Physics with Biomedical Physics:** There are 60 credits of Core modules. **Physics and Climate Physics:** There are 40 credits of Core modules. Choose 1 Pathway to a total value of 20 credits: Chemistry Earth and Ocean Sciences **Physics and Theoretical Physics:** There are 40 credits of Core modules. Choose 1 Pathway to a total value of 20 credits: Astrophysics Mathematical Studies Mathematics	**Physics and Applied Physics:** There are 50 credits of Core modules. Choose Electives to a value of 10 credits from the list available. **Physics with Astrophysics:** There are 60 credits of Core modules. **Physics with Biomedical Physics:** There are 60 credits of Core modules. **Physics and Climate Physics:** There are 60 credits of Core modules. **Physics and Theoretical Physics:** There are 60 credits of Core modules.	**Physics and Applied Physics:** There are 55 credits of Core modules. Choose one Elective to a value of 5credits from the list available. **Physics with Astrophysics:** There are 60 credits of Core modules. **Physics with Biomedical Physics:** There are 60 credits of Core modules. **Physics and Climate Physics:** There are 55 credits of Core modules. Choose one Elective to a value of 5 credits from the list available. **Physics and Theoretical Physics:** There are 45 credits of Core modules. Choose 1 project to a value of 10 credits: Final Year Project Project Theoretical Physics Choose one Elective to a value of 5 credits: Algebraic Foundations of Quantum Computing Modelling I

Module Descriptors for Years 1 to 4 are available at: https://www.universityofgalway.ie/science-engineering/undergraduateprogrammes/bachelorofsciencephysics-degreeoptionsinappliedastrophysicsbiomedicalclimatetheoretical/#course_outline

BSc Physics – Stream: Physics and Applied Physics

Year 1

[Core: 30 credits; Options: 30 credits]

Full Year – Semester 1 and Semester 2

PH101 **Physics [15]**
PH109 **Physics Special Topics [10]**

One of:

MA180 **Mathematics (Honours) [15]***
MA161 **Mathematical Studies [15]***

One of:

BO101 **Biology [15]***
CH101 **Chemistry [15]***
MP180 **Applied Mathematics [15]***

Semester 1

CS103 **Computer Science [5]**

* Select two 15-credit modules

Year 2

[Core: 30 credits; Options: 10 credits; Pathway: 20 credits]

Semester 1

MP231 **Mathematical Methods I [5]**
PH2105 **Mechanics and Thermodynamics [5]**
PH2109 **Physics Laboratory and Computational Physics I [5]**
CS2101 **Programming for Science and Finance [5]***
ST2001 **Statistics in Data Science I [5]***
MP236 **Mechanics I [5]***
PH2111 **Makerspace Creative Technologies [5]***

Semester 2

PH2106 **Atomic Physics and Electromagnetism [5]**
MP232 **Mathematical Methods II [5]**
PH2110 **Physics Laboratory and Computational Physics II [5]**
CS211 **Programming and Operating Systems [5]***
ST2002 **Statistics in Data Science II [5]***
MP237 **Mechanics II [5]***
PH2108 **Scaling Big Ideas [5]***

Continued...

* Select modules to a value of 10 credits – 5 credits per semester.
Select 1 Pathway to a value of 20 credits.

Year 3

[Core: 50 credits; Options: 10 credits]

Full Year – Semester 1 and Semester 2

PH3101 **Experimental and Computational Physics [15]**

Semester 1

MP345 **Mathematical Methods I [5]**
PH338 **Properties of Materials [5]**
PH333 **Quantum Physics [5]**
PH331 **Wave Optics [5]**
MP305 **Modelling I [5]***
PH328 **Physics of the Environment I [5]***
ST311 **Applied Statistics I [5]***
PH222 **Astrophysical Concepts [5]***
PH2111 **Makerspace Creative Technologies [5]***

Semester 2

MP346 **Mathematical Methods II [5]**
PH335 **Nuclear and Particle Physics [5]**
PH337 **Thermal Physics [5]**
PH329 **Physics of the Environment II [5]***
PH2108 **Scaling Big Ideas [5]***
PH362 **Stellar Astrophysics [5]***
MP307 **Modelling II [5]***
ST312 **Applied Statistics II [5]***

* Select modules to a value of 10 credits – 5 credits per semester

Year 4

[Core: 55 credits; Options: 5 credits]

Full Year – Semester 1 and Semester 2

PH4102 **Final Year Project [20]**
PH4101 **Physics Problem Solving [5]**

Semester 1

PH424 **Electromagnetism and Special Relativity [5]**
PH421 **Quantum Mechanics [5]**
PH422 **Solid State Physics [5]**
PH428 **Atmospheric Physics & Climate Change [5]***
PH430 **Biophotonics [5]***

Semester 2

PH423 **Applied Optics & Imaging [5]**
PH425 **Lasers & Spectroscopy [5]**
PH429 **Nanotechnology [5]**
PH4109 **Exoplanets and Planet Formation [5]***

* Select one 5-credit module

Module Descriptors for Years 1 to 4 are available at: https://www.universityofgalway.ie/science-engineering/undergraduateprogrammes/bachelorofsciencephysics-degreeoptionsinappliedastrophysicsbiomedicalclimatetheoretical/#course_outline

BSc Physics – Stream: Physics and Applied Physics

Year 1	Year 2	Year 3	Year 4
[Core: 30 credits; Options: 30 credits]	**[Core: 30 credits; Options: 10 credits; Pathway: 20 credits]**	**[Core: 50 credits; Options: 10 credits]**	**[Core: 55 credits; Options: 5 credits]**
	MATHEMATICAL STUDIES PATHWAY* *Semester 1* MA211 **Calculus I [5]*** MA284 **Discrete Mathematics [5]*** *Semester 2* MA212 **Calculus II [5]*** MA203 **Linear Algebra [5]*** **MATHEMATICS PATHWAY*** *Semester 1* MA2286 **Differential Forms [5]*** MA284 **Discrete Mathematics [5]*** *Semester 2* MA2287 **Complex Analysis [5]*** MA283 **Linear Algebra [5]***		
* Select two 15-credit modules	* Select modules to a value of 10 credits – 5 credits per semester. Select 1 Pathway to a value of 20 credits.	* Select modules to a value of 10 credits – 5 credits per semester	* Select one 5-credit module

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BSc Physics – Stream: Physics with Astrophysics

Year 1	Year 2	Year 3	Year 4
[Core: 45 credits; Options: 15 credits]	**[Core: 60 credits]**	**[Core: 60 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2 MP180 Applied Mathematics [15] PH101 Physics [15] PH109 Physics Special Topics [10] MA180 Mathematics (Honours) [15]* MA161 Mathematical Studies [15]* *Semester 1* CS103 Computer Science [5]	*Semester 1* PH222 Astrophysics Concepts [5] MP231 Mathematical Methods I [5] MP236 Mechanics I [5] PH2105 Mechanics and Thermodynamics [5] PH2109 Physics Laboratory and Computational Physics I [5] CS2101 Programming for Science and Finance [5] *Semester 2* PH2106 Atomic Physics and Electromagnetism [5] MP232 Mathematical Methods II [5] MP237 Mechanics II [5] PH223 Observational Astronomy [5] PH2110 Physics Laboratory and Computational Physics II [5] CS211 Programming and Operation Systems [5]	*Full Year – Semester 1 and Semester 2* PH363 Astronomical Data Analysis [5] PH3101 Experimental and Computational Physics [15] *Semester 1* MP345 Mathematical Methods I [5] PH338 Properties of Materials [5] PH333 Quantum Physics [5] PH331 Wave Optics [5] *Semester 2* MP346 Mathematical Methods II [5] PH335 Nuclear and Particle Physics [5] PH362 Stellar Astrophysics [5] PH337 Thermal Physics [5]	*Full Year – Semester 1 and Semester 2* PH4102 Final Year Project [20] PH4101 Physics Problem Solving [5] *Semester 1* MP403 Cosmology and General Relativity [5] PH424 Electromagnetism and Special Relativity [5] PH421 Quantum Mechanics [5] PH422 Solid State Physics [5] *Semester 2* PH4109 Exoplanets and Planet Formation [5] PH423 Applied Optics & Imaging [5] PH425 Lasers & Spectroscopy [5]
* Select one 15-credit module			

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BSc Physics – Stream: Physics with Biomedical Physics

Year 1	Year 2	Year 3	Year 4
[Core: 45 credits; Options: 15 credits]	**[Core: 60 credits]**	**[Core: 60 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2 BO101 Biology [15] PH101 Physics [15] PH109 Physics Special Topics [10] MA180 Mathematics (Honours) [15]* MA161 Mathematical Studies [15]* *Semester 1* CS103 Computer Science [5]	*Semester 1* AN2102 Histology of the Fundamental Tissues [5] MP231 Mathematical Methods I [5] MA215 Mathematical Molecular Biology I [5] PH2105 Mechanics and Thermodynamics [5] PH2109 Physics Laboratory and Computational Physics I [5] ST2001 Statistics in Data Science I [5] *Semester 2* PH2106 Atomic Physics and Electromagnetism [5] MP232 Mathematical Methods II [5] MA216 Mathematical Molecular Biology II [5] PH2110 Physics Laboratory and Computational Physics II [5] ST2002 Statistics in Data Science II [5] AN226 Systems Histology [5]	*Full Year – Semester 1 and Semester 2* PH3101 Experimental and Computational Physics [15] *Semester 1* MP345 Mathematical Methods I [5] PH338 Properties of Materials [5] PH333 Quantum Physics [5] PH339 Radiation & Medical Physics [5] PH331 Wave Optics [5] *Semester 2* PH340 Biomedical Physics [5] MP346 Mathematical Methods II [5] PH335 Nuclear and Particle Physics [5] PH337 Thermal Physics [5]	*Full Year – Semester 1 and Semester 2* PH4102 Final Year Project [20] PH4101 Physics Problem Solving [5] *Semester 1* PH430 Biophotonics [5] PH424 Electromagnetism and Special Relativity [5] PH421 Quantum Mechanics [5] PH422 Solid State Physics [5] *Semester 2* PH423 Applied Optics & Imaging [5] PH425 Lasers & Spectroscopy [5] PH4108 Soft Condensed Matter [5]
* Select one 15-credit module			

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BSc Physics – Stream: Physics and Climate Physics

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 40 credits; Options: 20 credits]**	**[60 credits]**	**[60 credits]**
Full Year – Semester 1 and Semester 2 MP180 Applied Mathematics [15]* CH101 Chemistry [15] PH101 Physics [15] PH109 Physics Special Topics [10] MA161 Mathematical Studies [15]* MA180 Mathematics (Honours) [15]* *Semester 1* CS103 Computer Science [5]	*Semester 1* PH2105 Mechanics and Thermodynamics [5] PH2109 Physics Laboratory and Computational Physics I [5] MP231 Mathematical Methods I [5] MG3113 Megatrends [5] Semester 2 PH2106 Atomic Physics and Electromagnetism [5] BSS2104 Introduction to Sustainability I [5] PH2110 Physics Laboratory and Computational Physics II [5] MP232 Mathematical Methods II [5] **CHEMISTRY PATHWAY*** *Semester 1* CH204 Inorganic Chemistry [5]* CH203 Physical Chemistry [5]* *Semester 2* CH202 Organic Chemistry [5]* CH205 Analytical and Environmental Chemistry [5]* **EARTH AND OCEAN SCIENCES PATHWAY*** *Semester 1* EOS213 Introduction to Ocean Science [10]* *Semester 2* EOS2102 The Earth: From Core to Crust [10]*	*Full Year – Semester 1 and Semester 2* PH3101 Experimental and Computational Physics [15] *Semester 1* MP345 Mathematical Methods I [5] PH328 Physics of the Environment I [5] PH338 Properties of Materials [5] PH333 Quantum Physics [5] PH331 Wave Optics [5] *Semester 2* MP346 Mathematical Methods II [5] PH335 Nuclear and Particle Physics [5] PH329 Physics of the Environment II [5] PH337 Thermal Physics [5]	*Full Year – Semester 1 and Semester 2* PH4102 Final Year Project [20] PH4101 Physics Problem Solving [5] *Semester 1* PH428 Atmospheric Physics & Climate Physics [5] PH424 Electromagnetism and Special Relativity [5] PH421 Quantum Mechanics [5] PH422 Solid State Physics [5] *Semester 2* PH425 Lasers & Spectroscopy [5] EOS4101 Earth Observation and Remote Sensing[5] PH4105 Ocean Climate Physics [5]
* Select one 15-credit module	* Select one 20-credit pathway		

BSc Physics – Stream: Physics and Theoretical Physics

Year 1	Year 2	Year 3	Year 4
[Core: 45 credits; Options: 15 credits]	**[Core: 40 credits; Pathway: 20 credits]**	**[60 credits]**	**[Core 45 credits; Option: 15 credits]**
Full Year – Semester 1 and Semester 2 MP180 Applied Mathematics [15] PH101 Physics [15] PH109 Physics Special Topics [10] MA180 Mathematics (Honours) [15]* MA161 Mathematical Studies [15]* *Semester 1* CS103 Computer Science [5]	*Semester 1* MP231 Mathematical Methods I [5] PH2105 Mechanics and Thermodynamics [5] MP236 Mechanics I [5] PH2109 Physics Laboratory and Computational Physics I [5] *Semester 2* PH2106 Atomic Physics and Electromagnetism [5] MP232 Mathematical Methods II [5] MP237 Mechanics II [5] PH2110 Physics Laboratory and Computational Physics II [5] **MATHEMATICAL STUDIES PATHWAY*** *Semester 1* MA211 Calculus I [5]* MA284 Discrete Mathematics [5]* *Semester 2* MA212 Calculus II [5]* MA203 Linear Algebra [5]*	*Full Year – Semester 1 and Semester 2* PH3102 Experimental and Computational Physics for Theoretical Physics [10] *Semester 1* MP345 Mathematical Methods I [5] MP410 Non-Linear Elasticity [5] ^ PH338 Properties of Materials [5]^ MP356 Quantum Mechanics I [5]^ PH331 Wave Optics [5] *Semester 2* MP346 Mathematical Methods II [5] MP307 Modelling II [5] PH335 Nuclear and Particle Physics [5] PH337 Thermal Physics [5] MP357 Quantum Mechanics II [5]^	*Full Year – Semester 1 and Semester 2* MM4000 Final Year Project [10]* PH4101 Physics Problem Solving [5] *Semester 1* MA4102 Algebraic Foundations of Quantum Computing [5]* PH428 Atmospheric Physics & Climate Change [5] MP403 Cosmology and General Relativity [5] MP305 Modelling I [5]* MP356 Quantum Mechanics I [5]^ MP410 Non-Linear Elasticity [5] ^ PH422 Solid State Physics [5] *Semester 2* PH423 Applied Optics & Imaging [5] PH4107 Project Theoretical Physics [10]* MP491 Non Linear Systems [5] MP357 Quantum Mechanics II [5]^
* Select one 15-credit module	* Select one 20-credit pathway	^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.	* Select one Project to a value of 10 credits. * Select one elective to a value of 5 credits. ^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.

BSc Physics – Stream: Physics and Theoretical Physics

Year 1	Year 2	Year 3	Year 4
[Core: 45 credits; Options: 15 credits]	**[Core: 40 credits; Pathway: 20 credits]**	**[60 credits]**	**[Core 45 credits; Option: 15 credits]**
	MATHEMATICS PATHWAY* *Semester 1* MA2286 **Differential Forms [5]*** MA284 **Discrete Mathematics [5]*** *Semester 2* MA2287 **Complex Analysis [5]*** MA283 **Linear Algebra [5]*** **ASTROPHYSICS PATHWAY*** *Semester 1* PH222 **Astrophysical Concepts [5]*** CS2101 **Programming for Science and Finance [5]*** *Semester 2* PH223 **Observational Astronomy [5]*** CS211 **Programming and Operating Systems [5]***		
* Select one 15-credit modules	* Select 1 Pathway to a value of 20 credits.	^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.	* Select one Project to a value of 10 credits. * Select one elective to a value of 5 credits. ^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.

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