

6.8 Department of Physics

6.8.1 Postgraduate programmes in Physics

6.8.1.1 BScHons in Physics

Programme Code

12998 – 797 (128)

Specific Admission Requirements

- A BSc degree with Physics as major with an average final mark of at least 60% in Physics 3.

- Applications which deviate from the abovementioned requirement, for example if a BSc degree was obtained elsewhere, will only be considered on recommendation of the Department and approval by the Faculty Committee.
- The Department may require supplementary work, depending on your background.

Closing Date for Applications

Apply online at <https://student.sun.ac.za> by 31 October of the previous year and submit all supporting documents where applicable. Late applications can be submitted until 30 November. In exceptional cases, if there are any places available, applications will be considered until the beginning of the academic year.

If you are not an SU student, please note that your application may take longer to process due to the verification of qualifications. Therefore, apply early.

Promotion Rules

- To obtain this degree you must pass with an average of at least 50% and achieve a subminimum of 45% in all modules.
- If you achieved at least 40% in a module or modules of 16 credits or less, the Department will allow a second assessment opportunity in the modules concerned.
- If you are taking the Radiation and Health Physics focal area you should note that a final mark of 50% in Physics 718, 750, 751, 752 and 753 is required to be admitted to an internship as a medical physicist.

Programme Structure

The following focal areas are offered:

- BScHons in Physics (Laser Physics focal area);
- BScHons in Physics (Nuclear Physics focal area);
- BScHons in Physics (Radiation and Health Physics focal area); and
- BScHons in Physics (Theoretical Physics focal area).

Duration of Programme

The normal duration of the programme is one year, but under exceptional circumstances and at the discretion of the department, it is possible to repeat a module. The programme begins a week before the general start of classes.

Programme Content

The curricula of the respective focal areas are set out below.

Focal area Laser Physics (128 credits)

Compulsory Modules

(credits = 104)

Compulsory modules can only be replaced by alternative modules in consultation with the coordinator of the Laser Physics Honours programme, and with approval of the departmental programme committee.

Subject Number	Module Code	Credits	Module Name	Semester
10445	711	8	Electromagnetism	1
10590	712	8	Lagrange and Hamilton Mechanics	1
10586	714	16	Quantum Mechanics B (Advanced Formalism and Applications)	1
10390	716	8	Atomic Physics	1
10702	721	16	Statistical Physics B (Introduction to Interacting and Non-equilibrium Systems)	2
63274	741	32	Physics Project	2
13934	745	8	Laser Technology	2
17221	772	8	Optics	1

plus

Elective Modules

(credits = 24)

Please note: The elective modules available in any particular year will vary depending on availability of

lecturing staff or visiting lecturers. The programme offering for a given academic year will be finalised and approved by the departmental programme committee before the start of the academic year and communicated to potential students.

Choose three of the following modules to the value of 24 credits.

Subject Number	Module Code	Credits	Module Name	Semester
10752	713	8	Solid State Physics	1
13940	742	8	Special Topics in Applied Photonics	Both
13939	743	8	Special Topics in Biophotonics	Both
12546	744	8	Laser Spectroscopy	2
13936	746	8	Quantum Optics	2
10610	747	8	Molecular Physics	2
13937	773	8	Nonlinear Optics	2
13938	774	8	Special Topics in Optics	Both

Focal area Nuclear Physics (128 credits)

Compulsory Modules

(credits = 112)

Subject Number	Module Code	Credits	Module Name	Semester
10445	711	8	Electromagnetism	1
10590	712	8	Lagrange and Hamilton Mechanics	1
10752	713	8	Solid State Physics	1
10586	714	16	Quantum Mechanics B (Advanced Formalism and Applications)	1
10708	718	8	Radiation Interaction	2
10702	721	16	Statistical Physics B (Introduction to Interacting and Non-equilibrium Systems)	2
63274	741	32	Physics Project	2
10563	748	8	Nuclear Reactions and Nuclear Structure	2
10706	753	8	Radiation Protection	2

plus

Elective Modules

(credits = 16)

Choose two of the following modules.

Please note: All of these modules will not necessarily be presented each year

Subject Number	Module Code	Credits	Module Name	Semester
10587	719	8	Quantum Mechanics C (Functional Integral Formulation)	1
13941	749	8	Selected Topics in Nuclear Physics	2
10753	754	8	Many-body Theory	2
10674	755	8	Relativistic Quantum Field Theory	2

Focal area Radiation and Health Physics (128 credits)

Compulsory Modules

Compulsory modules can only be replaced by alternative Physics modules in consultation with the

coordinator of the Radiation and Health Physics Honours programme, and with approval of the departmental programme committee.

Subject Number	Module Code	Credits	Module Name	Semester
10445	711	8	Electromagnetism	1
10590	712	8	Lagrange and Hamilton Mechanics	1
10752	713	8	Solid State Physics	1
10586	714	16	Quantum Mechanics B (Advanced Formalism and Applications)	1
10390	716	8	Atomic Physics	1
10708	718	8	Radiation Interaction	2
63274	741	32	Physics Project	2
10563	748	8	Nuclear Reactions and Nuclear Structure	2
10467	750	8	Physics of Radiation Dosimetry/Radiology	2
10465	751	8	Physics of Nuclear Medicine	2
10466	752	8	Physics of Radiotherapy	2
10706	753	8	Radiation Protection	2

Focal area Theoretical Physics (128 credits)

Compulsory Modules

(credits = 96)

Subject Number	Module Code	Credits	Module Name	Semester
10445	711	8	Electromagnetism	1
10590	712	8	Lagrange and Hamilton Mechanics	1
10752	713	8	Solid State Physics	1
10586	714	16	Quantum Mechanics B (Advanced Formalism and Applications)	1
13948	719	8	Relativistic Quantum Mechanics	1
10702	721	16	Statistical Physics B (Introduction to Interacting and Non-equilibrium Systems)	2
63274	741	32	Physics Project	2

plus

Elective Modules

(credits = 32)

Please note: The elective modules available in any particular year will vary depending on availability of lecturing staff or visiting lecturers. The programme offering for a given academic year will be finalised and approved by the departmental programme committee before the start of the year and communicated to potential students.

Choose modules from the following list to the value of 16 credits.

Subject Number	Module Code	Credits	Module Name	Semester
13985	757	8	Bayesian Physics	2
10424	758	8	Dynamic Systems and Complexity	1
10753	754	8	Many-body Theory	2
10674	755	16	Relativistic Quantum Field Theory	2
13942	756	8	Selected Topics in Theoretical Physics	2

plus

Choose modules to the value of 16 credits from honours modules in Physics, Mathematics or Applied Mathematics in consultation with the Department of Physics.

2. General information on the postgraduate programmes

2.1 BScHons degree

- 2.1.1 The degree BScHons can be awarded to you if you –
- 2.1.1.1 have obtained a bachelor's degree approved by Senate for this purpose and upon written application, were admitted to the BScHons programme; and
 - 2.1.1.2 have been registered as a student at the University for at least one year (after obtaining the bachelor's degree), have passed the prescribed written examination and successfully completed an oral examination.
- 2.1.2 The BScHons programme is taken in one of the majors of the BSc according to the provisions of the BSc programme. Students, who followed a BSc programme that does not lead to a BScHons programme, may be accepted to a BScHons programme provided that the BScHons programme can only begin after an examination in the required subject or subjects was successfully completed.
- 2.1.3 An average final mark of at least 60% in the major or prescribed modules in the final year of study is required for admission to a BScHons programme in the major in question. If you do not comply with this requirement, you may only be accepted to a BScHons programme if a recommendation has been made by the department concerned and with the special approval of the Faculty Committee of the Faculty of Science.
- 2.1.4 Specific provisions concerning BScHons programmes in specific subjects are given under the module content of the applicable subjects.
- 2.1.5 BScHons students are not allowed to take any additional third-year subject that includes practical work in the first year of the BScHons. However, if the BScHons programme concerned does not require practical work, you can, depending on the approval of the Faculty Board, be allowed to take an additional third-year subject.

2.2 MSc degree

- 2.2.1 The MSc degree can be awarded to you if you –
- 2.2.1.1 have obtained an honours degree approved by Senate for this purpose and upon written application, have been admitted to the proposed MSc programme; and
 - 2.2.1.2 have followed an approved programme of research or advanced study of at least one year (after obtaining the BScHons degree) at this University or at any other place approved by Senate; and
 - 2.2.1.3 have submitted a satisfactory thesis or assignment, depending on the requirements of the department concerned, and have completed an oral examination.
- 2.2.2 Specific provisions concerning MSc programmes in specific subjects are given in the module content of the subjects concerned.
- 2.2.3 MSc students are not allowed to take any additional third-year subject that includes practical work in the first year of the MSc. However, if the MSc programme concerned does not require practical work, you can, depending on the approval of the Faculty Board, be allowed to take an additional third-year subject.
- 2.2.4 After three years of full-time MSc studies, you must reapply for continuation of studies.

Please note: For the regulations regarding attendance, examiners, thesis requirements, submission and binding of theses, etcetera, consult the Section "Postgraduate Qualifications" in Part 1 (General Rules) of the University's Yearbook.

2.3 PhD degree

- 2.3.1 The PhD degree can be awarded to you if you –
- 2.3.1.1 have obtained a Master's degree approved by Senate for this purpose, or have achieved a level of competence in a particular field of study that Senate considers suitable for the purpose, and upon written application been accepted by Senate to the PhD programme; and
 - 2.3.1.2 have followed an approved programme of research and possible supplementary study, which may include a period of research at another place approved by Senate, for at least two years

after obtaining the above-mentioned Master's degree or after gaining the above-mentioned level of competence; and

2.3.1.3 have submitted a satisfactory dissertation; and

2.3.1.4 have completed an oral examination.

2.3.2 After four years of full-time PhD studies, you must reapply for continuation of studies.

Please note: For the regulations regarding attendance, examiners, dissertation requirements, submission and binding of dissertations, etcetera, consult the Section "Postgraduate Qualifications" in Part 1 (General Rules) of the University's Yearbook.

2.4 DSc degree

2.4.1 As a candidate for the DSc degree you must –

2.4.1.1 have conducted advanced, original research or creative work, to the satisfaction of the University, in the field of the natural sciences;

2.4.1.2 have submitted original work(s) of a high standard that has already been published, on a central theme, making a substantial contribution of high quality, in the view of Senate, to the enrichment of knowledge in the field of the natural sciences; and

2.4.1.3 have completed an oral examination to the satisfaction of the University.

2.4.2 If you already hold a PhD degree from the Faculty of Science or any other qualification that Senate considers an equivalent, you must –

2.4.2.1 have been registered at this University for the DSc degree for at least one academic year before the degree can be awarded to you and at least five years must have passed after obtaining the PhD degree, or another degree or qualification that is considered to be equally acceptable, before being awarded the DSc degree; and

2.4.2.2 have notified the Registrar in writing of the intention to be a candidate for the degree at least one year before presenting yourself for the degree and provided the title(s) and scope of the proposed work(s). Once Senate accepts the application, a supervisor and examiners will be appointed.

2.4.3 If you hold an MSc degree from the Faculty of Science or any other qualification that the Senate considers an equivalent, you must –

2.4.3.1 have been registered at this University for the DSc degree for at least three academic years before the degree can be awarded to you and at least seven years must have passed after obtaining the MSc degree, or another degree that is considered an equivalent, before being awarded the DSc degree; and

2.4.3.2 have notified the Registrar in writing of the intention to be a candidate for the degree at least three years before presenting yourself as a candidate and provided the title(s) and scope of the proposed work(s). Once Senate accepts the application, a supervisor and examiners will be appointed.

2.4.4 You must submit one copy of the work(s) that you want to present per examiner before 1 September (if you want to graduate in December), or before 1 December of the previous year (if you want to graduate in March) at the University office. The copies must be accompanied by a written statement that it is your original work and that the work has not been submitted to this or any other university for the purpose of obtaining any degree. If a substantial part of the submitted work was published under your name and that of another author, you must submit satisfactory testimony detailing which part of the work was done by you. Furthermore, you must mention who started the work, under whose supervision the work was done, who did the work, processed and submitted it to paper, and, if applicable, what part of the work was submitted to any university for the purposes of obtaining a degree.

Disclaimer:

The content above comes from the 2024 Science Yearbook. Make sure to consult the full *Science* to see this extract in context and to check if there have been any changes. Take special note of additional information in the yearbook under section *2. General provisions for postgraduate programmes.*