



Tillykke med din bachelorgrad fra Aarhus Universitet

Hermed fremsendes beviset på, at du har afsluttet din bacheloruddannelse fra Aarhus Universitet. Jeg vil i den anledning ønske dig hjerteligt tillykke. Med en anerkendt og velfunderet bacheloruddannelse har du skabt et solidt fundament for at nå dine mål for fremtiden. Det gælder, hvad enten du fortsætter på universitetet, søger beskæftigelse i erhvervslivet eller et helt andet sted.

Langt de fleste af universitetets bachelorer vælger at fortsætte deres uddannelse med en kandidatuddannelse. Aarhus Universitet tilbyder en bred vifte af kandidatuddannelser – både nogle, der dækker et meget specifikt og snævert fagligt felt, og andre, der går på tværs af såvel fag- som fakultetsgrænser. Jeg håber, at du finder en uddannelse, der passer til dine ønsker og behov.

Du kan holde kontakten til Aarhus Universitet ved at tilmelde dig alumnenetværket via Aarhus Universitets hjemmeside og få faglig viden, tilbud og netværksmuligheder ligesom tæt på 40.000 andre tidligere studerende.

Universitetets valgsprog er Solidum petit in profundis – "Søger i dybet den faste grund". Valgsproget betegner den stræben, som er forudsætningen for at studere ved Aarhus Universitet. Jeg håber, at du vil fortsætte med at søge i dybet og finde den faste grund.

Velkommen blandt Aarhus Universitets bachelorer.

Med venlig hilsen

Kristian Pedersen

Dekan for Aarhus Universitet Faculty of Natural Sciences





Congratulations on your Bachelor's degree from Aarhus University

We are enclosing a certificate confirming that you have completed your Bachelor's degree programme at Aarhus University. Allow me to congratulate you warmly on your achievement.

A robust and widely recognised Bachelor's degree provides you with a sound basis for achieving your goals in the future, no matter whether you plan to continue your studies at the university or seek employment in the business community or elsewhere.

The vast majority of the university's Bachelor graduates choose to continue their studies on a Master's degree programme. Aarhus University conducts a broad range of Master's degree programmes – some covering a highly specific and narrow subject field, and others that cross the boundaries between subjects and faculties. I hope you find a degree You can stay connected to Aarhus University by becoming a member of the Alumni Network via Aarhus University's website and receive research news and offers like close to 40,000 other former students.

The motto of Aarhus University is "Solidum petit in profundis" ("Seek a firm footing in the depths"). This motto describes the kind of hard work that is needed to study here. I hope you will continue to seek in the depths and find a firm footing.

Welcome to the ranks of Aarhus University's Bachelor graduates.

Sincerely,

Kristian Pedersen
Dean of Aarhus University Faculty of Natural Sciences





AARHUS UNIVERSITY

Side 1 af 3

061097-0265
201805275

Nikolaj Roager Christensen

HAR DEN 4. FEBRUAR 2022 BESTÅET

Bacheloruddannelsen i fysik

VED AARHUS UNIVERSITET
OG HAR DERMED RET TIL AT BETEGNE SIG

Bachelor (BSc) i fysik
Bachelor of Science (BSc) in Physics

Aarhus, den 23. februar 2022

Kristian Pedersen

dekan for Aarhus Universitet Faculty of Natural Sciences





I henhold til bekendtgørelse nr. 20 af 9. januar 2020 om universitetsuddannelser tilrettelagt på heltid (Uddannelsesbekendtgørelsen) er bacheloruddannelsen en forskningsbaseret uddannelse, der kvalificerer til selvstændigt at varetage erhvervsfunktioner på baggrund af kundskaber og metodiske færdigheder inden for et eller flere fagområder.

Bacheloruddannelsen i fysik er normeret til: **180 ECTS**

Nikolaj Roager Christensen

har opnået følgende resultater:

	<u>7-trinsskala</u>	<u>ECTS-skala</u>	<u>Bestået</u>
Obligatoriske kurser			
Atom- og molekylfysik 5 ECTS	12	A	Bestået
Eksperimentel fysik og statistisk dataanalyse 10 ECTS			Bestået
Eksperimentel fysik 2 5 ECTS			Bestået
Eksperimentel fysik 3 5 ECTS			Bestået
Elektrodynamik 10 ECTS	12	A	Bestået
Elektromagnetisme, bølger og optik 10 ECTS	7	C	Bestået
Fagets videnskabsteori og etik: Fysik og geoscience 5 ECTS	7	C	Bestået
Kerne- og partikelfysik 5 ECTS	12	A	Bestået
Kvantemekanik 10 ECTS	12	A	Bestået
Mekanik og termodynamik 10 ECTS	10	B	Bestået
Relativitetsteori og astrofysik 10 ECTS	12	A	Bestået
Statistisk fysik og faststoffysik 10 ECTS	7	C	Bestået
Videregående mekanik 5 ECTS	12	A	Bestået
Støttefag			
Calculus beta 10 ECTS	12	A	Bestået
Fourieranalyse 5 ECTS	12	A	Bestået
Lineær algebra 10 ECTS	10	B	Bestået





Valgfrie fysikkurser Galakser og kosmologi 10 ECTS	12	A	Bestået
Valgfrie matematikkurser Algebra 10 ECTS	10	B	Bestået
Matematisk analyse 1 10 ECTS			Bestået
Matematisk analyse 2 10 ECTS	12	A	Bestået
Bachelorprojekt Bachelorprojekt i fysik 15 ECTS Quantum optimal control with limitedtime resolution	10	B	Bestået

Bevisets rigtighed bekræftes

Aarhus, den 23. februar 2022

Maja Frank
uddannelsesadministrativ medarbejder





Kompetenceprofil for uddannelsen

Uddannelsen giver bacheloren det faglige fundament for varetagelse af selvstændige jobfunktioner i private og offentlige virksomheder og organisationer, som fordrer grundlæggende faglig indsigt og kunnen inden for fysik. Bacheloren har endvidere de fornødne kvalifikationer for videre studier på kandidatniveau.

Bacheloren har gennem uddannelsen erhvervet og udviklet en række intellektuelle, faglige og praktiske kompetencer:

- bacheloren har kendskab til fysik bredt og behersker centrale discipliner, metoder, teorier og begreber inden for fysik
- bacheloren kan deltage i planlægning og gennemførelse af projekter og anvende resultaterne af disse i relevante sammenhænge
- bacheloren kan anvende og reflektere over metoder til analyse og løsning af faglige spørgsmål og problemstillinger
- bacheloren kan strukturere egen kompetenceudvikling
- bacheloren er i stand til at sætte sig ind i nye emneområder inden for fysik
- bacheloren kan formidle og kommunikere faglige spørgsmål og problemstillinger
- bacheloren kan på naturvidenskabelig baggrund indgå i konstruktivt samarbejde om løsning af faglige problemstillinger





Nikolaj Roager Christensen

HAS ON 4 FEBRUARY 2022 PASSED THE EXAMINATIONS REQUIRED FOR THE

Bachelor's Degree Programme in Physics

AT AARHUS UNIVERSITY
AND HAS THUS BEEN AWARDED THE DEGREE

Bachelor of Science (BSc) in Physics
Bachelor (BSc) i fysik

Aarhus, 23 February 2022

Kristian Pedersen
Dean of Aarhus University Faculty of Natural Sciences





Pursuant to the Ministerial Order no. 20 of 9 January 2020 on Degree Programmes at Universities (the University Programme Order (Uddannelsesbekendtgørelsen)), the Bachelor's degree is a research-based full time programme of study which qualifies graduates for professional careers by providing them with expertise and methodological competences in one or more subject areas.

The Bachelor's Degree Programme in Physics is rated at: **180 ECTS**

Nikolaj Roager Christensen

has obtained the following results:

	<u>7-point scale</u>	<u>ECTS scale</u>	<u>Passed</u>
Compulsory Courses			
Atomic and Molecular Physics 5 ECTS	12	A	Passed
Experimental Physics and Statistical Data Analysis 10 ECTS			Passed
Experimental Physics 2 5 ECTS			Passed
Experimental Physics 3 5 ECTS			Passed
Electrodynamics 10 ECTS	12	A	Passed
Electromagnetism, Waves and Optics 10 ECTS	7	C	Passed
Philosophy and Ethics of Science: Physics and Geoscience 5 ECTS	7	C	Passed
Nuclear and Particle Physics 5 ECTS	12	A	Passed
Quantum Mechanics 10 ECTS	12	A	Passed
Mechanics and Thermodynamics 10 ECTS	10	B	Passed
Relativity and Astrophysics 10 ECTS	12	A	Passed
Statistical Physics and Solid State Physics 10 ECTS	7	C	Passed
Advanced Mechanics 5 ECTS	12	A	Passed
Additional Courses			
Calculus Beta 10 ECTS	12	A	Passed
Fourier Analysis 5 ECTS	12	A	Passed
Linear Algebra 10 ECTS	10	B	Passed





	<u>7-point scale</u>	<u>ECTS scale</u>	<u>Passed</u>
Elective Physics Courses			
Galaxes and Cosmology 10 ECTS	12	A	Passed
Elective Mathematics Courses			
Algebra 10 ECTS	10	B	Passed
Mathematical Analysis 1 10 ECTS			Passed
Mathematical Analysis 2 10 ECTS	12	A	Passed
Bachelor's Project			
Bachelor's Project in Physics 15 ECTS Quantum optimal control with limitedtime resolution	10	B	Passed

The validity of this document is confirmed

Aarhus, 23 February 2022

Maja Frank
Administrative Officer





Skills Profile for the Programme

The degree programme provides the Bachelor with the academic basis for assuming independent job functions in private or public sector companies and organisations that require basic insight and skills in Physics. In addition, the Bachelor has the necessary qualifications for further studies at a Master's degree level.

By completing the degree programme, the Bachelor acquires and develops a number of intellectual, academic and practical skills:

- The Bachelor has comprehensive knowledge of Physics, and masters key disciplines, methodologies, theories and concepts in Physics.
- The Bachelor can participate in the planning and implementation of projects, and apply the results of these in relevant contexts.
- The Bachelor can apply and reflect on the methodologies used to analyse and solve academic questions and issues.
- The Bachelor can structure his/her own competence development.
- The Bachelor is capable of grasping new topics in Physics.
- The Bachelor can relay and communicate academic questions and issues.
- The Bachelor can collaborate constructively on a scientific basis to solve subject-related issues.





Diploma Supplement

This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1 INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Last name(s)

Christensen

1.2 First name(s)

Nikolaj Roager

1.3 Date of birth (dd/mm/yyyy)

06/10/1997

1.4 Student identification number or code

Matriculation number: 201805275 / Civil registration number: 061097-0265

2 INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of qualification and (if applicable) title conferred (in original language)

Bachelor (BSc) i fysik
Bachelor of Science (BSc) in Physics

2.2 Main field(s) of study for the qualification

The degree programme provides students with thorough insight into physics, which comprises at least half of the content of the degree programme. In addition, the degree programme provides knowledge of computer science, as well as basic knowledge of mathematics.

2.3 Name and status of awarding institution (in original language)

Aarhus Universitet (Aarhus University) is an independent institution under the public-sector administration and supervised by the Ministry of Higher Education and Science and regulated according to the University Act no. 261 of 18 March 2015.

2.4 Name and status of institution (if different from 2.3) administering studies (in original language)

Not applicable / as above

2.5 Language(s) of instruction/examination

Teaching/examination at Aarhus University takes place in Danish and English, although other languages may be used when appropriate.





3 INFORMATION ON THE LEVEL AND DURATION OF THE QUALIFICATION

3.1 Level of qualification

Bachelor's degree at NQF/EQF Level 6 referring to First Cycle in the Bologna QF

3.2 Official duration of programme in credits and/or years

180 ECTS

3.3 Access requirements

Admission to the Bachelor degree programme requires a) The Upper Secondary School Leaving Examination, or b) Higher Preparatory Examination, or c) Higher Business Examination or d) Higher Technical Examination. Applicants with other qualifications may be admitted after an assessment of their qualifications.

4 INFORMATION ON THE PROGRAMME COMPLETED AND THE RESULTS OBTAINED

4.1 Mode of study

Full-time.

4.2 Programme learning outcomes

The degree programme covers physics and computer science and includes mathematics as an auxiliary subject. Areas dealt with in physics early in the programme include mechanics, thermodynamics, electromagnetism, optics, quantum mechanics, the theory of relativity and a laboratory programme. In the third year of the degree programme, two or more of the following topics are covered: atomic physics, nuclear physics, particle physics, solid state physics, statistical physics, astrophysics and experimental exercises. Finally, students are required to write a Bachelor's degree project.

4.3 Programme details, individual credits gained and grades/marks obtained

Please refer to the enclosed transcript of records

4.4 Grading system and, if available, grade distribution table

<http://ufm.dk/en/education-and-institutions/the-danish-education-system/grading-system>

4.5 Overall classification of the qualification (in the original language)

Not applicable for Danish qualifications

5 INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study

The university bachelor's degree qualifies students for occupational functions and for postgraduate studies e.g. for the candidatus degree.

5.2 Access to a regulated profession (if applicable)

Not applicable





6 ADDITIONAL INFORMATION

6.1 Additional information

Aarhus University offers unique, alternative opportunities for research and education cutting across many different subjects, for the benefit of both students and researchers, as well as the authorities and the business community. These interdisciplinary combinations provide exceptional opportunities. Aarhus University combines quality in its services with diversity - a diversity that also makes sure that the university is in wide-reaching contact with all the important sectors of society.

Aarhus University has an international focus and makes targeted efforts to attract researchers and students from abroad.

Research and education

Academic values form the basis for all activities at Aarhus University. Via curious research, critical analysis and ongoing debate, researchers and students endeavour to find new ways to gain insight, understanding and education for the benefit of society as a whole. The university consists of four main academic areas. Combined, they cover the entire research spectrum - basic research, applied research, strategic research and research-based advice to the authorities. In all degree programmes, research and education are closely connected, and the research-based instruction - including teaching that spans the main academic areas - ensures the depth of the degree programmes.

A visionary university

The mission of Aarhus University is to ensure and develop knowledge, welfare and culture through research and research-based education, knowledge dissemination and external advice. The vision of Aarhus University is to belong to the elite of universities and to contribute to the development of national and global welfare via outstanding research and world-class degree programmes. The values of Aarhus University are based on the ethical challenges regarding freedom and independence that are described in the Magna Charta of European Universities. Staff and students at Aarhus University work enquiringly and critically, in open and dynamic interaction with the surrounding world.

6.2 Further information sources

For further information on this degree programme, please refer to <http://studieguide.au.dk/en> and the Aarhus University web site <http://www.au.dk/en>.





7 CERTIFICATION OF THE SUPPLEMENT

7.1 Date

23 February 2022

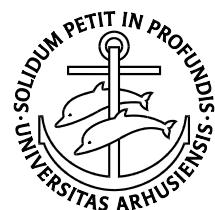
7.2 Signature

Kristian Pedersen

7.3 Capacity

Dean of Aarhus University Faculty of Natural Sciences

7.4 Official stamp or seal



8 INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

Please see the attached description of The Danish Higher Education System of April 2016





The Danish Higher Education System

April 2016

Public higher education institutions in Denmark are regulated by national legislation concerning degree structures, teacher qualifications and examinations. Accreditation in higher education is undergoing transition from programme-based accreditation to institutional accreditation. Programmes and institutions are accredited by national, independent accreditation agencies and the Accreditation Council.

Higher education institutions

Higher education is offered by five types of higher education institutions:

1. Business academies (*Erhvervsakademi*) offering professionally oriented short cycle and first cycle degree programmes.
2. University Colleges (*Professionshøjskole*) offering professionally oriented first cycle degree programmes.
3. Maritime Education and Training Institutions offering professionally oriented short cycle and first cycle degree programmes.
4. General and specialised research universities (*Universitet*) offering first, second and third cycle degree programmes in academic disciplines.
5. University level institutions offering first, second and third cycle degree programmes in subject fields such as architecture, design, music, and fine and performing arts.

Most higher education institutions are regulated by the Ministry of Higher Education and Science (type 1-5). The Ministry of Culture regulates a number of higher education institutions offering programmes within fine and performing arts (type 5).

Degrees in the Danish Higher Education System

Danish qualifications levels	Ordinary higher education degrees	Adult/continuing higher education degrees	Qualifications Framework for the European Higher Education Area – Bologna Framework	European/National Qualifications Framework for Lifelong Learning – EQF/NQF
Academy Profession level	Academy Profession (AP) degree (90-150 ECTS)	Academy Profession (AP) degree (60 ECTS) (also known as Further Adult Education (VU) degree)	Short cycle	Level 5
Bachelor's level	Professional Bachelor's degree (180-270 ECTS)*	Diploma degree (60 ECTS)	First cycle	Level 6
	Bachelor's degree (within the arts) (180 ECTS)			
	Bachelor's degree (180 ECTS)			
Master's level	Master's degree (within the arts) (120-180 ECTS)	Master degree (60-90 ECTS)	Second cycle	Level 7
	Master's degree (120 ECTS)**			
PhD level	PhD degree (180 ECTS)		Third cycle	Level 8

* Can be obtained through a full regular bachelor's programme (180-270 ECTS) or a top up bachelor's programme following an Academy Profession degree.

** A few Master's programmes are up to 180 ECTS.

Higher education institutions measure study activities in ECTS credits. 60 ECTS correspond to one year full-time study.

Qualifications framework

The qualification levels form the basis for the Danish National Qualifications Framework for Higher Education, which is certified in accordance with the overarching Bologna Framework according to the principles adopted by the European Ministers of Higher Education. Danish higher education qualifications at levels 5-8 of the Danish Qualifications Framework for Lifelong Learning (NQF) correspond with levels 5-8 of the European Qualifications Framework (EQF).

Admission and progression

General access to higher education in Denmark requires an Upper Secondary School Leaving Certificate or comparable qualifications. Admission to some particular programmes requires entrance examination or submission of a portfolio of artistic work. Holders of an Academy Profession degree can obtain a Professional Bachelor's degree within the same field of study through a top-up programme. Completion of a first cycle degree qualifies students for admission to the second cycle.

Ordinary Higher Education degrees

The Academy Profession degree is awarded after 90-150 ECTS and includes a period of work placement of at least 15 ECTS. The programmes are development-based and combine theoretical studies with a practical approach. Programmes are, among others, offered within Marketing Management, Computer Science and Chemical and Biotechnical Science. The Danish title is field of study followed by the abbreviation *AK* and the English title is *AP Graduate in* [field of study].

The Professional Bachelor's degree is awarded after 180-270 ECTS and includes a period of work placement of at least 30 ECTS. The programmes are applied programmes. They are development-based and combine theoretical studies with a practical approach. Examples of professional bachelor's degree holders are nurses, primary and lower secondary school teachers and certain types of engineers. The Danish title is *Professionsbachelor i* [field of study] and the English title is *Bachelor of* [field of study].

The Bachelor's degree from a university is awarded after 180 ECTS. The programmes are research-based and are offered in all scientific fields. The Danish title is *Bachelor (BA) i* [field of study] or *Bachelor (BSc) i* [field of study] and the English title is *Bachelor of Arts (BA) in* [field of study] or *Bachelor (BSc) of Science in* [field of study].

The Bachelor's degree (within the arts) is awarded after 180 ECTS. The programmes are based on research and artistic research. Programmes are offered within the fine arts. The Danish title is *Bachelor (BA) i* [field of study], *Bachelor i musik (BMus)* [field of study] or *Bachelor i billedkunst (BFA)* [field of study] and the English title is *Bachelor of Arts (BA) in* [field of study], *Bachelor of Music (BMus)* [field of study] or *Bachelor of Fine Arts (BFA) in* [field of study]. A higher education degree within theatre or filmmaking is awarded after 3-4 years of study (180-240 ECTS).

The Master's degree is awarded after 120 ECTS. The programmes are research-based and are offered in all scientific fields. The Danish title is abbreviated to *Cand.*[latin abbreviation of academic area] *i* [field of study]. The English title is *Master of Arts (MA) in* [field of study] or *Master of Science (MSc) in* [field of study].

The Master's degree (within the arts) is awarded after 120-180 ECTS. The programmes are based on research and artistic research. The Danish title is abbreviated to *Cand.*[latin abbreviation of academic area] [field of study]. The English title is *Master of Arts (MA) in* [field of study], *Master of Music (MMus)* [field of study] or *Master of Fine Arts (MFA) in* [field of study]. Music Academies offer a specialist degree of 2 to 4 years following the master's degree.

The PhD degree is awarded after 180 ECTS. PhD programmes are offered by the universities and some university level institutions offering degrees in the artistic and cultural field.

Detailed descriptions of degree levels can be found in the Danish Qualifications Framework at www.nqf.dk. Please consult the relevant Diploma Supplement for information about the learning outcome of any specific degree.

Adult and continuing higher education

The programmes normally consist of 2 years of part-time study, equivalent to 1 year of full-time study (60 ECTS credits). Certain master programmes require 1½ years of full-time study (90 ECTS credits). Admission requirements are a relevant educational qualification and at least 2 years of relevant work experience.

Adult and continuing education is available at levels corresponding to qualifications of the ordinary higher education system. The Further Adult Education degree (*videregående voksenuddannelse/akademiuddannelse*) is awarded after studies at short cycle level and gives access to diploma programmes.

The Diploma degree (*diplomuuddannelse*) is awarded after studies at first cycle level and gives access to master programmes. The Master degree (*masteruddannelse*) is awarded after studies at second cycle level.

The 7-point grading scale

The grading system used in all state-regulated education programmes as of September 2007 is the 7-point grading scale. Apart from the 7-point grading scale, pass/fail assessment may also be used. 02 is the minimum grade for passing an exam.

Description of grades: 12: For an excellent performance displaying a high level of command of all aspects of the relevant material, with no or only a few minor weaknesses; 10: For a very good performance displaying a high level of command of most aspects of the relevant material, with only minor weaknesses; 7: For a good performance displaying good command of the relevant material but also some weaknesses; 4: For a fair performance displaying some command of the relevant material but also some major weaknesses; 02 For a performance meeting only the minimum requirements for acceptance; 00: For a performance which does not meet the minimum requirements for acceptance; -3 For: a performance which is unacceptable in all respects.