

Maximillian Fornitz Vording

Cpr.: 230791-2123


har gennemført bacheloruddannelsen i  
Fysik  
6. november 2014



## Oversigt over prøver og bedømmelser side 1 af 2

Følgende resultater er opnået	Resultat 7-trinsskala	Resultat ECTS-skala	ECTS point
<b>Bachelorprojekt</b>			
Bachelorprojekt i de fysiske fag ..... <i>Modeling Temperature Bacteriophage Plaque Formation</i>	12	A	15,0
<b>Bachelorfagpakke</b>			
Indledende mekanik og relativitetsteori .....	4	D	7,5
Introduktion til matematik i naturvidenskab .....	7	C	7,5
Lineær algebra i naturvidenskab .....	10	B	7,5
Videregående klassisk mekanik .....	4	D	7,5
Matematik F .....	7	C	7,5
Termodynamik og projekt .....	7	C	7,5
Elektromagnetisme .....	4	D	7,5
Biofysik: Introduktion til biofysik .....	12	A	7,5
Elektrodynamik og bølger .....	02	E	7,5
Kvantemekanik 1 .....	10	B	7,5
Videnskabsteori og etik for fysikere .....	12	A	7,5
Kvantemekanik 2 .....	10	B	7,5

11. december 2014

  
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SCIENCE Uddannelse

DET NATUR- OG BIOVIDENSKABELIGE FAKULTET  
KØBENHAVNS UNIVERSITET

Maximillian Fornitz Vording

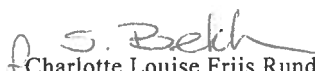
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## Oversigt over prøver og bedømmelser side 2 af 2

Følgende resultater er opnået	Resultat 7-trinsskala	Resultat ECTS-skala	ECTS point
Statistisk fysik.....	10	B	7,5
Eksperimental fysik .....	12	A	7,5
<b>Tilvalg</b>			
Almen molekylærbiologi.....	12	A	7,5
Dynamiske systemer og kaos.....	12	A	7,5
Biological Sequence Analysis .....	12	A	7,5
Biologiske netværk (Bionet).....	10	B	7,5
<b>Valgfrit</b>			
Objektorienteret programmering og design .....	10	B	7,5
Datalogi for fysikere.....	Bestået		7,5
Topics in Physics of Complex Systems.....	12	A	7,5
Computational Methods in Simulation.....	12	A	7,5

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## Summary of examinations and grades page 1 of 2

The following grades were awarded

	Grade 7-point scale	Grade ECTS scale	ECTS credits
<b>Bachelor Project</b>			
Bachelor Project in Physics..... <i>Modeling Temprate Bacteriophage Plaque Formation</i>	12	A	15,0
<b>Computational Courses</b>			
Introduction to Mechanics and Relativity Theory.....	4	D	7,5
Introduction to Mathematics for Science.....	7	C	7,5
Linear Algebra in Science.....	10	B	7,5
Classical Mechanics .....	4	D	7,5
Mathematics for Physicists.....	7	C	7,5
Thermodynamics and Project .....	7	C	7,5
Electromagnetism .....	4	D	7,5
Introduction to Biophysics .....	12	A	7,5
Electrodynamics and Waves.....	02	E	7,5
Quantum Mechanics 1 .....	10	B	7,5
Scientific Theory and Ethics .....	12	A	7,5
Quantum Mechanics 2 .....	10	B	7,5

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## Summary of examinations and grades page 2 of 2

The following grades were awarded	Grade 7-point scale	Grade ECTS scale	ECTS credits
Statistical Physics.....	10	B	7,5
Experimental Physics.....	12	A	7,5
<b>Elective Courses</b>			
General Molecular Biology .....	12	A	7,5
Dynamical Systems and Chaos .....	12	A	7,5
Biological Sequence Analysis .....	12	A	7,5
Biological Networks .....	10	B	7,5
<b>Optional Courses</b>			
Object-oriented Programming and Design.....	10	B	7,5
Introduction to Computing for Physicists.....	Passed		7,5
Topics in Physics of Complex Systems .....	12	A	7,5
Computational Methods in Simulation .....	12	A	7,5

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## Kompetenceprofil for uddannelsen

Uddannelsen giver den studerende et grundlæggende kendskab til og indsigt i teoretiske og eksperimentale facetter af de fysiske fags metoder og videnskabelige grundlag herunder brugen af it. Uddannelsens obligatoriske fag præsenterer fysikkens væsentligste fagområder inden for klassisk fysik, relativistisk fysik og kvantefysik. Bacheloren skal desuden foretage en selvvalgt profilering af sin uddannelse. Sammen med bachelorprojektet skal uddannelsen kvalificere til videreuddannelse på kandidatniveau samt varetagelse af erhvervsfunktioner.

### 1. Kompetencer

En bachelor i de fysiske fag har kompetencer til at:

- analysere en naturvidenskabelig problemstilling ud fra en fysisk synsvinkel
- formulere spørgsmål, der kan løses eller belyses ved hjælp af fysik
- udvikle og anvende kvalitative og kvantitative modeller for fysiske systemer
- analysere et problem ud fra forskellige data og kritisk diskutere løsningsmetoder
- vurdere kvaliteten af videnskabelige resultater
- identificere egne læringsbehov og strukturere egen læring
- indgå selvstændigt i fagligt og tværfagligt samarbejde med en professionel fysisk tilgang

### 2. Færdigheder

En bachelor i de fysiske fag har færdigheder i at:

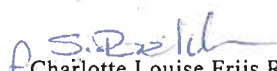
- tilrettelægge målinger til undersøgelser af systemer, herunder mekaniske, elektriske, elektromagnetiske, optiske, og termodynamiske størrelser
- løse matematiske problemstillinger både med analytiske og numeriske metoder
- anvende modeløsning og målemetoder inden for de fysiske fag og tæt beslægtede områder
- forklare og formidle sin viden om fysikkens generelle sammenhænge på dansk og på engelsk i både mundtlig og skriftlig form
- beskrive anvendelsen af fagets resultater i en industriel og samfundsmæssig sammenhæng
- anvende computerbaserede værktøjer (IKT) som både kommunikations-, modellerings- og databehandlingsværktøj

### 3. Viden

En bachelor i de fysiske fag har viden om:

- de grundlæggende fysiske love inden for klassisk mekanik, termodynamik, elektromagnetisme, kvantemekanik
- de fundamentale principper for de forskellige kræfter, der virker på hver længdeskala
- målemetoder til måling af forskellige fysiske størrelser
- hvordan man vurderer kvalitet af forskellige resultater
- matematiske metoder til løsning af en lang række forskellige problemer
- numeriske metoder til databehandling og løsning af matematiske modeller
- etiske problemstillinger, overvejelser og argumenter forbundet med de fysiske fag

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## Skills profile for the programme

The objective of the programme is to provide students with a basic knowledge of and insight into theoretical and experimental aspects of physics' methods and scientific basis, including the use of IT. The compulsory subjects cover the major physics disciplines, i.e. classical physics, relativistic physics and quantum physics. Students are also required to develop a custom profile. Along with the Bachelor Project, the programme qualifies graduates for employment and to continue their studies at MSc level.

### 1. Competences

Bachelors in Physics possess the competences to:

- analyse a scientific problem from a physics perspective
- formulate questions that can be resolved or clarified by physics
- develop and apply qualitative and quantitative models for physical systems
- analyse a problem using a variety of data and critically discuss the possible methods of solving it
- evaluate the quality of scientific results
- identify their own learning needs and structure their own learning accordingly
- work independently and in academic and interdisciplinary groups with a professional physics approach

### 2. Skills

Bachelors in Physics possess the skills to:

- develop measurements for studies of systems, including mechanical, electrical, electromagnetic, optical and thermodynamic systems
- solve complex mathematical problems using both analytical and numerical methods
- use modelling and quantification methods in physics and adjacent subject areas
- explain and disseminate their knowledge of physics in general contexts, in Danish and in English, both orally and in writing
- discussing the use of the subject's results in an industrial and social context
- use computer-based tools (ICT) for communications, modelling and data-processing purposes

### 3. Knowledge

Bachelors in Physics have acquired knowledge of:

- the basic laws of physics in classical mechanics, thermodynamics, electromagnetism and quantum mechanics
- the fundamental principles of the various forces acting at each scale of longitude
- quantification methodology for various physical entities
- how to evaluate the quality of different results
- mathematical methods for solving a wide variety of problems
- numerical methods for data processing and solving mathematical models
- ethical issues, considerations and arguments associated with the physics disciplines

11 December 2014



## Diploma Supplement

This Diploma Supplement follows the model 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. Family name(s): Vording
- 1.2. Given name(s): Maximillian Fornitz
- 1.3. Date of birth: 23 July 1991
- 1.4. Danish civil registration number: 230791-2123

### 2. INFORMATION IDENTIFYING THE QUALIFICATION

- 2.1. Name of qualification and title conferred (*in Danish*): B.Sc. i fysik

Name of qualification and title conferred (*in English*): B.Sc. in Physics

- 2.2. Main fields of study: Physics
- 2.3. Name and status of awarding institution: Københavns Universitet, University of Copenhagen (officially abbreviated KU) is a state-financed higher education institution, regulated according to the Ministry of Higher Education and Science University Act no. 960 of 14 August, 2014.
- 2.4. Name and status of institution administering the studies (See 2.3.): enter if different

- 2.5. Language(s) of instruction/examination: Primarily Danish and to some extent English

### 3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

- 3.1. Level of qualification: Theoretically, research based tertiary programme, Bachelor Programme
- 3.2. Official length of programme: 3 years = 180 ECTS credit points ECTS
- 3.3. Access requirements: Entrance to Bachelor's degree programmes is subject to the regulations contained in order no. 181 of 23 February 2010 issued by the Danish Ministry of Science, Technology and Innovation.

### 4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

- 4.1. Mode of study: Full time study
- 4.2. Programme requirements: Entrance to Bachelor's degree programmes is subject to the regulations contained in order no. 154 of 5th March 2000 issued by the Danish Ministry of Education.
- 4.3. Programme details and individual grades/marks/credits obtained: Please refer to the enclosed grade transcript.
- 4.4. Grading scheme and if applicable grade distribution information: Please refer to the enclosed explanation of the Danish education system and the grading scale.
- 4.5. Overall classification of the qualification: Not applicable for Danish qualifications.

### 5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

- 5.1. Access to further study: A Bachelor's degree in a given subject area qualifies graduates for entrance to the Master's degree programme in this area, providing that there is a sufficient number of student places available.

**5.2. Professional status:**

**6. ADDITIONAL INFORMATION**

**6.1. Additional information:** Founded in 1479 by the Danish King Christian I, the University of Copenhagen is Denmark's oldest and largest institution of research and higher education. More than 37,000 students are enrolled in undergraduate and graduate programmes, plus an additional 2,500 PhD students. Staff members number 9,000. The University is divided into six faculties: Theology, Law, Social Sciences, Health and Medical Sciences, Humanities and Science; all situated in the capital of Denmark.

**6.2. Further information:** Faculty of Science


Bülowsvej 17  
DK - 1870 Frb. C.

Phone +45 +4535332828  
Fax +45 35324240  
E-mail: [science@science.ku.dk](mailto:science@science.ku.dk)

General information on higher education in Denmark can be obtained from the following two homepages: Ministry of Science, Technology and Innovation: [www.vtu.dk](http://www.vtu.dk), or Danish Rectors Conference: [www.rks.dk](http://www.rks.dk)

**7. CERTIFICATION OF THE SUPPLEMENT**

**7.1. Date:** 11 December 2014

  
**7.2.** Charlotte Louise Friis Rundsten

**7.3.** SCIENCE Study Administration

**7.4. SEAL**





## 8. The Danish Higher Education System May 2013

Public higher education institutions in Denmark are regulated by national legislation concerning degree structures, teacher qualifications and examinations. All programmes 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. Academies of Professional Higher Education (*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. Research universities (*Universitet*) offering first, second and third cycle degree programmes in all 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 of the higher education institutions are regulated by the Ministry of Science, Innovation and Higher Education (type 1-5). The Ministry of Culture regulates a small number of higher education institutions offering first, second and third cycle degree programmes in 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 (VUU) 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 (180-240 ECTS) or a top up bachelor's programme following an Academy Profession degree. \*\* A few Master's programmes are up to 180 ECTS.

Danish higher education institutions use ECTS credits for measuring study activities. 60 ECTS correspond to one year's 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) are also compatible 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. Completion of a short-cycle degree qualifies students for admission to a first cycle programme. 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 180-240 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 4 years of study (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](http://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 education qualifications are available at levels corresponding to those 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 (*diplomuddannelse*) 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.