






Personal information

 1 July 1992, Helsinki, Finland
 Abraham Wetterin tie 14 C 37
00880 Helsinki, Finland
 +358 45 356 2399
 joonas.herranen@iki.fi
 github.com/jherrane

Research profile

Numerical light scattering

Development and application of a state-of-the-art efficient scattering solver for irregular scatterers, modelling especially the dynamical effects of radiation.

Cosmic dust

Modelling shapes of dust grains and aggregates and their scattering properties is an integral part of e.g. understanding the radiative torque theory of dust and, further, the polarization of scattered and emitted light by dust.

Optical tweezers

Full dynamical simulations allow modelling optical tweezers, where small particles can be suspended and manipulated by light.

Education

2016 – Aug 2020 (planned)

PhD Astronomy
University of Helsinki
Research under the supervision of prof. Karri Muinonen

2015 – 2016

MSc Theoretical Physics
University of Helsinki
Overall grade 4/5
My MSc thesis started my PhD research, and earned the highest grade of Laudatur.

2012 – 2015

BSc Theoretical Physics
University of Helsinki

Joonas Herranen

Curriculum Vitae

Publications

Herranen, J. 2020, *Rotational disruption of nonspherical cometary dust particles by radiative torques*, *Astrophysical Journal*, 893, 109.

Herranen, J., Markkanen, J., Videen, G., & Muinonen, K. 2019, *Non-spherical particles in optical tweezers: a numerical solution*, *PLOS ONE*, 12(14): e0225773.

Herranen, J., Lazarian, A., & Hoang, T. 2019, *Radiative torques of irregular grains: describing the alignment of a grain ensemble*, *Astrophysical Journal*, 878, 96.

Herranen, J., Markkanen, J., & Muinonen, K. 2018, *Polarized scattering by Gaussian random particles under radiative torques*, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 205, 40.

Herranen, J., Markkanen, J., & Muinonen, K. 2017, *Dynamics of small particles in electromagnetic radiation fields: A numerical solution*, *Radio Science*, 52, 1016.

Herranen, J., Markkanen, J., & Muinonen, K. (2016). *Dynamics of Interstellar Dust Particles in Electromagnetic Radiation Fields* in 2016 URSI International Symposium on Electromagnetic Theory (EMTS) (p. 251-254). New York: IEEE.

Other publications

Herranen, J., & Lazarian, A. 2020, *Alignment of irregular grains by radiative torques: efficiency study*, *Astrophysical Journal*, submitted.

Herranen, J. 2020, *Dynamical response of small particles to light scattering*, Doctoral dissertation, ISBN 978-951-51-6118-5 (pdf), ISSN 1799-3024, University of Helsinki Report Series in Astronomy, No. 24.

Grants and fellowships

UH funded salary position for a PhD candidate
University of Helsinki

2017 – 2020

Study grant
Student's foundation of Tavastia Nation

2015, 2013

Undergraduate grant
Fund for Mathematics and Natural Sciences

2015, 2013

Awards and honors

Pro Gradu award exceptional MSc thesis
Faculty of Science, University of Helsinki

2016

Bronze medal in the International Chemistry Olympiad
IChO 2011

2011

Other education

2015 – 2019

Subject teacher

University of Helsinki

Qualification for teaching Physics, Mathematics, Chemistry and IT up to the secondary level in Finland.

Skills

Fortran, Python, Matlab 5+ yrs

Linux, Git, L^AT_EX 4+ yrs

Html/CSS, SQL 3+ yrs

Language proficiency

Finnish Native

English Fluent

Swedish Bureaucratic

Japanese Conversational

Additional activities

2020, Helsinki

The Night of Science

Bad Sci-Fi Night

A popular science lecture on science fiction tropes and related physics.

2018, 2019, Helsinki Observatory

International Asteroid Day

Organizer at the Helsinki Observatory's exhibition for general public as a part of the international event.

Conferences

EPSC

Virtual conference

2020

EPSC / DPS

Geneva, Switzerland

2019

Cosmic Dust

Sagamihara, Japan; Narashino, Japan

2018, 2019

ELS XVII / Laser-Light and Interactions with Particles (LIP) 2018

College Station, TX

2018

EPSC

Riga, Latvia

2017

Electromagnetic and Light Scattering (ELS) XVI

College Park, MD

2017

Bremen Workshop on Light Scattering

Bremen, Germany

2017

Annual Meeting for Division for Planetary Sciences (DPS) / European Planetary Science Conference (EPSC)

Pasadena, CA

2016

Electromagnetic Theory Symposium (EMTS)

Espoo, Finland

2016

Teaching experience

Statistical Inversion Methods

Assistant teacher

2020

Solar System Physics

Assistant teacher

2020

Fundamentals of Astronomy I

Assistant teacher

2018, 2019

Fundamentals of Astronomy II

Assistant teacher

2018

Electromagnetic Scattering I

Assistant teacher

2016, 2018

Research experience

Visiting researcher

University of Wisconsin/Madison

Two-month research visit to prof. A. Lazarian, focussed on improving the predictivity of radiative torque theory.

2019

Doctoral student

University of Helsinki

2016 – 2020

References

My advisor, professor Karri Muinonen
Department of Physics
University of Helsinki
karri.muinonen@helsinki.fi

Frequent collaborator, professor Alex Lazarian
Department of Astronomy
University of Wisconsin/Madison
alazarian@facstaff.wisc.edu

Collaborator, Dr. Gorden Videen
Army Research Laboratory
Maryland, US
gorden.videen@gmail.com

July 21, 2020

University of Helsinki
Department of Physics
Gustaf Hållströmin katu 2
PL 64, Helsinki, Finland
joonas.herranen@iki.fi

Post doc position (F*M), job ID: IWF035PD220

Space Research Institute (IWF)
Austrian Academy of Sciences

Dear Dr. Mannel,

I apply for the post doc position mentioned in the title. I defend my thesis, titled *Dynamical response of small particles to light scattering*, on August 25th, 2020, with Dr. B-G Andersson as my opponent.

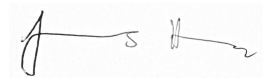
My research, as my teaching, experience focusses on numerical light scattering methods, applied to cosmic dust and other small particles, including cometary dust and particles trapped in optical tweezers. The main computational tools I have used are Fortran (numerical light scattering) and Python (input data and particle shape generation, data analysis and visualization). I also have a solid understanding of the electromagnetic theory.

I earned all my academic degrees in the University of Helsinki. During my time there, I have extensively studied theoretical physics, physics, mathematics, and chemistry. In addition I am a fully qualified teacher up to the secondary level in Finland. The extensive coverage of my knowledge is a strength and allows me to collaborate in many things, even if it means relative lack of depth of knowledge in fields other than my own expertise, scattering and dynamics of small particles.

In the near future, I expect to pursue new research goals. New vantage points will hopefully strengthen my qualities as a scientist.

After my graduation, I will append the application with my study certificates.

Sincerely,



Joonas Herranen

Attachments:

1) Study transcript from the University of Helsinki

Attachment 1: Transcript

Herranen Joonas Lauri Jooseppi
Abraham Wetterin tie 14 C 37
00880 HELSINKI

21.07.2020

014038411

Date of enrolment

01.07.1992

01.08.2011

PRIMARY STUDY RIGHT

Degree objective Doctor of Philosophy (science)
Decree Government Decree (794/2004) on University Degrees
Degree programme Doctoral Programme in Particle Physics and Universe Sciences

Valid: 22.06.2016 - Date of commencement 22.06.2016

DEGREES AND UPGRADING OF QUALIFICATIONS

00335	Master of Science (science)	Cr 141,00	Date 22.06.2016
00345	Bachelor of Science	Cr 181,00	Date 28.08.2015

COMPLETED CREDITS

Course		Cr	Grade	Language	Date
H528	Department of Physics				
00335	Master of Science (science)	141,00	Pass		22.06.2016
50034	MSc Other Studies	23,00	Pass		19.05.2016
530150	Individual study plan (Master's Degree)	1,00	Pass	Finnish	19.05.2016
530218	Major Physics Teachers' Laboratory Course II	5,00	4	Finnish	10.05.2016
530235	Major Physics Teachers' Laboratory Course I	5,00	5	Finnish	06.01.2015
53336	Structure of Matter I	8,00	2	Finnish	08.05.2013
53364	Orientation to Physics Education	2,00	Pass	Finnish	31.12.2013
53776	Special Course in Theoretical Physics Kosmologian kesäkoulu, 25.-28.5.2015	2,00	Pass	Finnish	28.05.2015
530125	Physics, Intermediate Studies (Minor)	35,00	4		10.03.2016
530141	Electronics I	5,00	3	Finnish	11.12.2013
530144	Physics' Intermediate Studies Laboratory Exercises I	5,00	4	Finnish	24.04.2015
53058	Materials Physics I	5,00	4	Finnish	30.10.2015
53319	Special Course in Physics Kiinteän aineen jatkomomekaniikka	5,00	4	Finnish	10.03.2016
53379	Measurement Methods in Physics I	5,00	3	Finnish	12.12.2013
53697	Fluid Phenomena	5,00	5	English	16.12.2015
53749	Basics of Continuum Mechanics	5,00	3	Finnish	02.05.2014
53729	Theoretical Physics, Advanced Studies	83,00	4		30.05.2016
50039	Maturity Test in Finnish MSc	0,00	Pass	Finnish	23.05.2016

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
530301	MSc seminar in physics and theoretical physics	3,00	Pass	Finnish	28.04.2016
53369	Scientific Computing III	10,00	3	English	31.05.2015
53713	Mathematical Methods of Physics III	10,00	5	Finnish	10.12.2015
53717	Quantum Mechanics II	10,00	3	English	28.04.2015
53765	Plasma Physics	5,00	3	Finnish	21.10.2014
53919	Electromagnetic Scattering I	5,00	5	Finnish	28.08.2015
50114	Master's Thesis in Theoretical Physics Tähtienvälisen pölyn dynamiikkaa sähkömagneettisessa säteilykentässä	40,00	L	Finnish	30.05.2016
00345	Bachelor of Science	181,00	Pass		28.08.2015
50042	BSc other Studies	32,00	Pass		30.04.2015
50099	Tutortraining and Tutoring	2,00	Pass	Finnish	04.10.2013
53001	Introduction to Physical Sciences	3,00	Pass	Finnish	31.12.2012
530147	Individual Study Plan (Bachelor's Degree)	1,00	Pass	Finnish	05.03.2015
530148	ICT-Driving Licence, Information Technology Skills	3,00	Pass	Finnish	11.09.2012
530168	Mother Tongue	3,00	Pass	Finnish	30.04.2015
53398	Scientific Computing I	5,00	5	Finnish	04.03.2013
53905	Universe Now	3,00	3	Finnish	24.10.2012
992911	Oral Skills in the Second Official Language, Swedish	2,00	G	Swedish	28.02.2013
992912	Written Skills in the Second Official Language, Swedish	1,00	SAT	Swedish	28.02.2013
99299	Japanese for beginners 1	5,00	Pass	Japanese	10.05.2013
99501Mat-l u	English Academic & Professional Skills: Reading, Writing & Spoken Communication (CEFR B2)*	4,00	Pass	English	19.06.2013
530133	Physics, Basic Studies (Minor)	25,00	4		03.06.2013
530140	Laboratory Exercises in Basic Studies	5,00	4	Finnish	03.06.2013
530281	Interactions and Bodies	5,00	4	Finnish	22.10.2012
530282	Matter and Interactions	5,00	4	Finnish	18.12.2012
530283	Electromagnetism	5,00	5	Finnish	05.03.2013
530284	Radiation Fields and Photons	5,00	5	Finnish	08.05.2013
53708	Theoretical Physics, Basic Studies	25,00	5		22.05.2014
530000	Fundamentals of Theory of Relativity	4,00	3	Finnish	06.03.2013
53703	Basics of Quantum Physics	5,00	4	Finnish	12.06.2013
53704	Mathematics for Physicists I	8,00	5	Finnish	23.10.2012
53705	Mathematics for Physicists II	8,00	5	Finnish	22.05.2014
53748	Theoretical Physics, Intermediate Studies	74,00	4		05.05.2015
50036	Maturity Test in Finnish BSc	0,00	Pass	Finnish	28.04.2015
53014	Thermal Physics	8,00	2	Finnish	12.12.2013

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
53399	Scientific Computing II	5,00	5	English	18.12.2013
537004	Statistical mechanics	5,00	1	Finnish	02.03.2015
537005	Quantum statistics	5,00	3	Finnish	05.05.2015
537010	Analytical Mechanics	5,00	3	Finnish	23.10.2013
537011	Electrodynamics I	5,00	2	Finnish	03.03.2014
537012	Electrodynamics II	5,00	5	Finnish	05.05.2014
53716	Quantum Mechanics I	10,00	4	Finnish	09.12.2014
53723	Mathematical Methods of Physics Ia	5,00	3	Finnish	31.10.2013
53724	Mathematical Methods of Physics Ib	5,00	5	Finnish	19.12.2013
53725	Mathematical Methods of Physics IIa	5,00	5	Finnish	28.04.2014
53726	Mathematical Methods of Physics IIb	5,00	4	Finnish	31.05.2014
53740	Bachelor's Thesis	6,00	5	Finnish	28.04.2015
	Vedyn spektri algebrallisin menetelmin				
57500	Mathematics, Basic Studies	25,00	5		22.10.2013
57016	Analysis I	10,00	5	Finnish	15.12.2012
57020	Topology I	10,00	4	Finnish	19.05.2013
57045	Introduction to Probability	5,00	5	Finnish	22.10.2013

Course		Cr	Grade	Language	Date
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Unincorporated studies

H516	Department of Mathematics and Statistics				
57512	Mathematics, Intermediate Studies (Minor)	35,00	4		18.10.2015
57014	Algebra I	10,00	2	Finnish	18.05.2014
57017	Analysis II	10,00	5	Finnish	19.05.2013
57043	Linear Algebra and Matrices I	5,00	5	Finnish	21.10.2012
57047	Linear Algebra and Matrices II	5,00	4	Finnish	16.12.2012
57121	Vector analysis I	5,00	4	Finnish	18.10.2015
57044	Differential Equations I	5,00	4	Finnish	15.06.2016
57048	Differential Equations II	5,00	1	Finnish	15.06.2016
57101	Measure and Integral	6,00	1	Finnish	20.06.2016
57160	Introduction to Logics I	5,00	5	English	17.06.2016

H523	Department of Computer Science				
584112	Computer Science, Basic Studies (minor)	25,00	5		21.12.2018
TKT10001	Introduction to Computer Science	5,00	5	Finnish	21.12.2018
TKT10004	Introduction to Databases	5,00	5	Finnish	23.10.2017
TKT20002	Methods for Software Engineering	5,00	4	Finnish	11.05.2018
581325	Introduction to Programming	5,00	5	Finnish	16.10.2012
582103	Advanced Course in Programming	4,00	5	Finnish	10.12.2012
582350	Programming Challenges I	1,00	Pass	Finnish	23.08.2017

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
584214	Computer Science, Intermediate Studies (minor)	39,00	4		08.03.2018
TKT10005	Computer Organization I	5,00	4	Finnish	20.12.2017
TKT20004	Introduction to Data Communication	5,00	3	Finnish	24.10.2017
TKT20006	Software Engineering	6,00	5	Finnish	19.12.2017
TKT20011	Intermediate Studies Project: Database Application	4,00	5	Finnish	08.03.2018
TKT21007	Server-side Web Development Java	5,00	5	Finnish	20.12.2017
TKT21015	Version Control	1,00	Pass	Finnish	19.12.2017
58131	Datastructures and Algorithms	9,00	3	Finnish	20.12.2016
AY5823951	Open uni: Cyber Security Base: Introduction to Cyber Security	1,00	Pass	English	13.11.2017
AY5823952	Open uni: Cyber Security Base: Securing Software	3,00	Pass	English	18.12.2017
H5293	Laboratory of Physical Chemistry				
55422	Structure of Atoms and Molecules	5,00	4	Finnish	16.04.2014
H5299	Teacher Education Unit				
55113	Chemistry, Basic Studies (Teacher, Minor)	25,00	4		29.04.2014
55003	Introduction to chemistry education(minor subject chemistry,teacher)	3,00	4	Finnish	20.12.2013
55004	Chemistry in environment	4,00	3	Finnish	29.04.2014
55015	Safety in the Laboratory	1,00	Pass	Finnish	13.08.2013
55310	Intermediate inorganic chemistry laboratory IA	3,00	Pass	Finnish	23.10.2013
55311	Intermediate inorganic chemistry laboratory IB	3,00	Pass	Finnish	23.10.2013
55314	General chemistry I	4,00	5	Finnish	20.09.2013
55315	General chemistry II	4,00	5	Finnish	20.09.2013
55521	Organic Chemistry I	3,00	1	Finnish	27.02.2014
H923	Doctoral school in natural sciences				
DONAS-997	General Competence Studies	10,00	Pass		13.04.2019
DONAS-107	Project management and leadership	2,00	Pass	English	13.04.2018
DONAS-201	International conference participation 1 ELS-XVI, College Park, Maryland, 20.-24.3.2017	1,00	Pass	English	24.03.2017
DONAS-202	International conference participation 2 ELS-XVII/LIP2018, Texas, College Station, 4.-9.3.2018	1,00	Pass	English	09.03.2018
DONAS-203	Scientific work abroad 1 Research visit 1.3.-13.4.2019. Madison, Wisconsin, U.S.A	1,00	Pass	English	13.04.2019
PED511	YP 1 Oppiminen yliopistossa	5,00	5	Finnish	30.10.2017

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
500-K003	Bachelor's Programme in Chemistry				
55116	Chemistry, Intermediate Studies (Teacher, Minor)	17,50	4		15.01.2018
MFK-K203	Chemical Concepts and Phenomena in Teaching	5,00	5	Finnish	15.12.2017
MFK-K302	Modeling and Visualization of Chemistry	5,00	5	Finnish	21.12.2017
55058	Basic laboratory work in chemistry II	3,00	4	Finnish	02.06.2017
55066	Organic chemistry labworks I	4,00	Pass	Finnish	15.01.2018
55069	Structure and spectroscopy of molecules	5,00	5	Finnish	17.11.2016
55111	Inquiry-based chemistry teaching I	5,00	4	Finnish	23.12.2016
55324	Analytical Chemistry	5,00	1	Finnish	30.05.2014
55508	Biological chemistry	3,00	1	Finnish	28.04.2014
500-K004	Bachelor's Programme for Teachers of Mathematics, Physics and Chemistry				
55116	Chemistry, Intermediate Studies (Teacher, Minor)	17,50	4		15.01.2018
MFK-K203	Chemical Concepts and Phenomena in Teaching	5,00	5	Finnish	15.12.2017
MFK-K302	Modeling and Visualization of Chemistry	5,00	5	Finnish	21.12.2017
55058	Basic laboratory work in chemistry II	3,00	4	Finnish	02.06.2017
55066	Organic chemistry labworks I	4,00	Pass	Finnish	15.01.2018
55069	Structure and spectroscopy of molecules	5,00	5	Finnish	17.11.2016
55111	Inquiry-based chemistry teaching I	5,00	4	Finnish	23.12.2016
55324	Analytical Chemistry	5,00	1	Finnish	30.05.2014
55508	Biological chemistry	3,00	1	Finnish	28.04.2014
525	Astronomy				
53861	Basics of Astronomy I	5,00	4	Finnish	20.12.2012
53862	Basics of Astronomy II	5,00	4	Finnish	04.03.2013
52810	Physics				
530006	Basics of Monte Carlo Simulations	5,00	3	English	03.03.2016
52811	Theoretical Physics				
53776	Special Course in Theoretical Physics Introduction to Quantum Gravity	1,00	Pass	English	27.05.2016
6201	Subject teacher education				
68600	Education Subject Studies (Cum Laude Approbatur) Pedagogical Studies for Teachers	60,00	3		12.05.2016
68199	Education, Pedagogical Studies for Teachers, Basic Studies in Education	25,00	3		14.12.2015
6206205	Facing specificity and multiplicity	6,00	3		16.10.2015

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
62062051	Special education	2,00	3	Finnish	15.10.2015
62062052	Multicultural education	2,00	3	Finnish	16.10.2015
62062053	Education for Diversities, Groups	2,00	Pass	Finnish	12.10.2015
68152	Basic practice	7,00	Pass	Finnish	14.12.2015
68251	Introduction to subject teaching	9,00	4		04.12.2015
681364	Observation Course in Teaching	1,00	Pass	Finnish	21.09.2015
68137	Introduction to General Didactics	1,00	4	Finnish	07.09.2015
68149	Subject-Specific Didactics, Lectures	2,00	4	Finnish	12.11.2015
68153Fys	Subject-Specific Didactics, grupp	2,00	5	Finnish	16.11.2015
68153Mat	Subject-Specific Didactics, grupp	2,00	4	Finnish	03.11.2015
68325	Self Estimation I	1,00	Pass	Finnish	04.12.2015
68104	Psychology of development and learning	2,00	1	Finnish	20.11.2015
68121	Interactional Skills I	1,00	Pass	Finnish	05.10.2015
68299	Education, Pedagogical Studies for Teachers, Intermediate Studies in Education	35,00	3		12.05.2016
68129	Evaluation and development of teaching	8,00	4		20.04.2016
68150	Subject-Specific Didactics, Lectures	2,00	1	Finnish	24.03.2016
68158Fys	Subject-Specific Didactics, grupp	2,50	4	Finnish	29.03.2016
68158Mat	Subject-Specific Didactics, grupp	2,50	5	Finnish	17.03.2016
68332	Self Estimation II	1,00	Pass	Finnish	20.04.2016
68162	Subject didactics 4	10,00	2		18.04.2016
68166	Seminar	7,00	2		18.04.2016
68206	Seminar I	3,00	Pass	Finnish	31.12.2015
68207	Seminar II	4,00	2	Finnish	18.04.2016
6206206	Introduction to educational research	3,00	3	Finnish	16.10.2015
68362	Teaching Practice	9,00	Pass	Finnish	06.05.2016
6206204	Social, Historical and Philosophical Foundations of Education, lectures and exam	3,00	2	Finnish	26.02.2016
681278	Social, historical and philosophical basis of education, group	1,00	Pass	Finnish	19.02.2016
68326	Applied practice	4,00	Pass	Finnish	12.05.2016
7923101 Doctoral Programme in Particle Physics and Universe Sciences					
PAPU-998	Discipline-Specific Studies	32,00	5		13.05.2019
DONAS-401	Research Ethics	1,00	Pass	English	31.10.2018
PAPU-001	PAPU Doctoral Student Seminar	3,00	Pass	English	13.05.2019
53728	Advanced Course in Statistical Physics	10,00	5	English	21.06.2017
53830	Seminar in Astronomy	3,00	Pass	English	19.05.2017

Herranen Joonas Lauri Jooseppi

21.07.2020

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COMPLETED CREDITS

Course		Cr	Grade	Language	Date
57720	Inverse problems including project work	15,00	5	English	05.05.2017

Total number of credits	625,00
Total number of transferred credits out of all credits	0,00

The language of completed studies has been registered at the University of Helsinki as of 1 August 2011.

Studies have been completed in the following languages

Finnish	531,00 cr
Swedish	3,00 cr
English	86,00 cr
Japanese	5,00 cr

Credits (Cr) correspond to the ECTS (European Credit Transfer System) credits (1 Cr = 1 ECTS Cr).
Credit units (Cu) are the credits (study weeks) of the old Finnish system.

GRADES USED AT THE UNIVERSITY OF HELSINKI

Completed studies and Bachelor's and Master's theses:
5 (excellent), 4 (very good), 3 (good), 2 (satisfactory), 1 (passable)

Old Master's theses, doctoral dissertations and Licentiate theses:
L (Laudatur), ECLA (Eximia cum laude approbatur), MCLA (Magna cum laude approbatur), CL (Cum laude approbatur), NSLA (Non sine laude approbatur), LUB (Lubenter approbatur), A (Approbatur)

Doctoral dissertations and Licentiate theses:
Pass, PasD (Pass with distinction)

Written and oral proficiency in the second national language of Finland:
G (good), SAT (satisfactory)

Practical training, skills courses and degrees:
Pass

The grading scale at the University of Helsinki is not a proportionate scale and does not therefore fully correspond to the ECTS grading scale.