Berner Fachhochschule

UNIVERSITÄT BERN

Curriculum
MSc Precision Engineering

School of Biomedical and Precision Engineering

Master of Science
Precision Engineering

Overview Full-Time Studies
Selected courses may be subject to change.

Course	Type	Semester	ECTS
Introduction to Ultraprecision Engineering	Basic Courses	1st	5 ECTS
Introduction to Optical Engineering	Basic Courses	1st	5 ECTS
Introduction to Materials and Analytics	Basic Courses	1st	5 ECTS
Physics and Structural Mechanics	Basic Courses	1st	5 ECTS
Modelling and Simulation	Basic Courses	1st	5 ECTS
Control and Automation	Basic Courses	1st	5 ECTS
Creative Engineering Lab I	Creative Engineering Lab I	2nd	12 ECTS
Advanced Courses I	Advanced Courses I	2nd	7 ECTS
Advanced Optical Design	Electives I	2nd	3 ECTS
Optics in Extreme Environments	Electives I	2nd	3 ECTS
Material Processing	Electives I	2nd	3 ECTS
Industry 4.0 and AI for Smart Production	Electives I	2nd	3 ECTS
Scientific Ethics, Writing and Presenting	Complementary Skills I	2nd	2.5 ECTS
Metrology and Sensing in Industrial Environment	Complementary Skills I	2nd	2.5 ECTS
Creative Engineering Lab II	Creative Engineering Lab II	3rd	12 ECTS
Advanced Courses II	Advanced Courses II	3rd	7 ECTS
Nano- and Micro Fabrication	Electives II	3rd	3 ECTS
In-Situ Characterisation Techniques	Electives II	3rd	3 ECTS
Heterogeneous Catalysis and Sustainable Chemistry	Electives II	3rd	3 ECTS
Laser and Laser Applications	Electives II	3rd	3 ECTS
Physical Basics of Non-Destructive Testing and Imaging	Electives II	3rd	3 ECTS
Innovation and Entrepreneurship	Complementary Skills II	3rd	2.5 ECTS
Innovation Management	Complementary Skills II	3rd	2.5 ECTS
Master Thesis		4th	30 ECTS

Overview 1st Semester
Basic Courses

Course	Lecturers	KSL
Introduction to Ultraprecision Engineering	Jürgen Burger (UniBE) Sylvain le Coultre (BFH)	479544-HS2023-0
Introduction to Precision Optics	Beat Neuenschwander (BFH) Thomas Feurer (UniBE)	479581-HS2023-0
Introduction to Materials and Analytics	Johann Michler (EMPA) Alex Dommann (EMPA)	479245-HS2023-0
Physics and Structural Mechanics	Jürgen Burger (UniBE) Toni Glaser (BFH) Sebastian Siep (BFH)	479545-HS2023-0
Modelling and Simulation	Nicolas Thomas (UniBE) Martin Züger (pinPlus AG)	479248-HS2023-0
Control and Automation	Thomas Niederhauser (BFH), Gabriel Gruener (BFH), Fabio Modica (BFH)	479252-HS2023-0

Timetable
1st Semester

Time	Monday	Wednesday	Thursday	Friday
9.15 - 10.00	Physics and Structural Mechanics	Control and Automation (Laboratory)	Introduction to Ultraprecision Engineering	Control and Automation
10.15 - 11.00				
11.15 - 12.00				
12.15 - 13.00				
13.15 - 14.00	Modelling and Simulation		Introduction to Materials and Analytics	Introduction to Precision Optics
14.15 - 15.00				
15.15 - 16.00				

Overview 2nd Semester

Advanced Courses I, Creative Engineering Lab I, Electives I, Complementary Skills I

Course	Lecturers	KSL
Advanced Course I Ultraprecision Engineering		481573-FS2024-0
Data Analysis and Applied Statistics for Engineers	*Pascale Anderle (HSet, UniBE)*	
Process Optimization	*Rouben Kerkbechian (MPS)*	
SLM for Metals	*Andreas Burn (SIPBB)*	
Thin Film Deposition	*Sylvain le Coultre (BFH)*	
Product Development Methods	*Hanspeter Keel (FH OST)*	
Highprecision Manufacturing & Characterisation	*Thomas Liebrich (RhySearch)* *Michael Marxer (FH OST)*	
Micro- and Nanosystems	*Jürgen Burger (UniBE)*	
Surface Processing on Atomic Scale	*Ivo Utke (EMPA)*	
Thermal Processes	*Simon Kleiner (BFH)*	
Creative Engineering Lab I Ultraprecision Engineering	Sandra Zwyssig (UniBE) Jürgen Burger (UniBE) Martin Hofmann (UniBE) Sylvain le Coultre (BFH) Toni Glaser (BFH)	481578-FS2024-0
Advanced Course I Optical Engineering		481579-FS2024-0
Beam Delivery	*Beat Neuenschwander (BFH)*	
Steering and Shaping	*Beat Neuenschwander (BFH)*	
2D and 3D Imaging	*André Stefanov (UniBE)*	
Distance Measurement	*André Stefanov (UniBE)*	
Optical Metrology	*André Stefanov (UniBE)*	
Image Processing	*Marcus Hudritsch (BFH)*	
Creative Engineering Lab I Optical Engineering	Stefan Remund (BFH) Beat Neuenschwander (BFH)	482565-FS2024-0
Optics in Extreme Environments	Nicolas Thomas (UniBE) Peter Wurz (UniBE)	481584-FS2024-0
Advanced Optical Design	Martin Lorenz (BFH)	481583-FS2024-0
Material Processing	Beat Neuenschwander (BFH)	481585-FS2024-0
Industry 4.0 and AI for Smart Production	Angela Meyer (BFH)	481677-FS2024-0
Metrology and Sensing in Industrial Environment	Marc-Olivier André (METAS)	481588-FS2024-0
Scientific Ethics, Writing and Presenting	Simon Milligan (UniBE) Mascha Kurpicz-Briki (BFH)	481587-FS2024-0

Students choose two electives and two complementary skills per semester.
One elective may be selected from a curated list of the MSc Biomedical Engineering Curriculum.

Timetable

2nd Semester

Time	Monday	Tuesday	Wednesday
08.15 - 09.00	CE Lab I	CE Lab I	CE Lab I
09.15 - 10.00			
10.15 - 11.15			
11.30 - 12.00	CE Lab I (self-study)	CE Lab I (self-study)	CE Lab I (self-study)
12.15 - 13.00			
13.15 - 14.00			
14.15 - 15.00	Advanced Course I	Electives I	Advanced Course I
15.15 - 16.00			
16.15 - 17.00		Complementary Skills I	Electives I
17.15 - 18.00			

Overview 3rd Semester

Advanced Courses II, Creative Engineering Lab II, Electives II, Complementary Skills II

Course	Lecturers	KSL
Advanced Course II Ultraprecision Engineering		485018-HS2023-0
Scanning Electron Microscopy, TEM, EDX, EBSD	*Vetsuisse & Institute of Anatomy (UniBE)*	
Optical Properties of Surfaces: Ellipsometry	*Thomas Nelis (BFH)*	
Micro- and Nanomechanical Testing	*Nicholas Randall (Alemnis)*	
Advanced Materials Science and Engineering	*Johann Michler (EMPA)*	
Defect Processes and Characterisation	*Alex Dommann (EMPA)*	
Modern Surface Physics and Chemistry	*Oliver Gröning (EMPA), Sylvain le Coultre (BFH)*	
Surfaces in Modern Nanometer Scale Science	*Oliver Gröning (EMPA), Sylvain le Coultre (BFH)*	
Creative Engineering Lab II Ultraprecision Engineering	Sandra Zwyssig (UniBE) Jürgen Burger (UniBE) Martin Hofmann (UniBE) Sylvain le Coultre (BFH)	485019-HS2023-0
Advanced Course II Optical Engineering		485020-HS2023-0
Nano- and Micro Optics	*Beat Neuenschwander (BFH)*	
Integrated Optics	*Thomas Feurer (UniBE)*	
Optical Sensors	*Zoltan Ollmann (BFH)*	
Optics in Industrial Environment	*Stefan Wittwer (Datatools)*	
Medical Optics	*Michael Jäger (UniBE)*	
Creative Engineering Lab I Optical Engineering	Stefan Remund(BFH) Beat Neuenschwander (BFH)	485021-HS2023-0
In-Situ Characterization Techniques	Thomas Nelis (BFH)	485024-HS2023-0
Nano- and Micro Fabrication	Cédric Bessire (BFH)	485023-HS2023-0
Physical Basics of Non-Destructive Testing and Imaging	Michael Jäger (UniBE) Alex Dommann (EMPA)	485026-HS2023-0
Laser and Laser Applications	Beat Neuenschwander (BFH) Thomas Feurer (UniBE)	485025-HS2023-0
Heterogeneous Catalysis and Sustainable Chemistry	Matthias Arenz (UniBE)	438012-HS2023-0
Innovation and Entrepreneurship	Artur Baldauf (UniBE)	485022-HS2023-0
Innovation Management	Jürgen Burger (UniBE) Sébastian Hug (UniBE), Marc Schmid (SBB)	485022-HS2023-0

Students choose two electives and two complementary skills per semester.
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Timetable

3rd Semester

Time	Monday	Tuesday	Wednesday
08.15 - 09.00	CE Lab II	CE Lab II	CE Lab II
09.15 - 10.00			
10.15 - 11.15			
11.30 - 12.00		CE Lab II (self-study)	
12.15 - 13.00	CE Lab II (self-study)		CE Lab II (self-study)
13.15 - 14.00		Advanced Course II	
14.15 - 15.00	Electives II		Advanced Course II
15.15 - 16.00		Electives ii	
16.15 - 17.00	Complementary Skills II		
17.15 - 18.00			

Biomedical Engineering, Computer Science and Institute of Applied Physics Curriculum
Electives

Course	Lecturers	Status
Applied Biomaterials	Peter Wahl (KSW)	407229-HS2023-0
Biomedical Laser Applications	Michael Jäger (UniBE), Martin Frenz (UniBE) Dominik Marti (UniBE)	7715-HS2023-0
C++ Programming I	Patrik Arnold (BFH)	394661-FS2023-0
C++ Programming II	Patrik Arnold (BFH)	414078-HS2023-0
Medical Robotics	Stefan Weber (UniBE) Gabriel Gruener (BFH)	102193-FS2023-0
Microsystems Engineering	Patrick Schwaller (BFH)	102195-FS2023-0
Rehabilitation Technology	Juan Fang (BFH) Kenneth Hunt (BFH)	102197-FS2023-0
Applied Optimization	David Bommes (UniBE)	453846-HS2023-0
Computer Vision	Paolo Favaro (UniBE)	102470-HS2023-0
Fluid Mechanics	Dominik Obrist (UniBE)	399221-FS2023-0
Introduction to Digital Signal Processing	Lilian Witthauer (Univeritätspoliklinik)	472941-HS2023-0
Low Power Microelectronics	Christof Baeriswyl (BFH)	102194-FS2023-0
Numerical Methods	Horst Heck (UniBE) Stéphane Félix (UniBE)	101707-HS2023-0
Selected Chapters in Mathematics AND Short Introduction to MATLAB	André Lisibach (BFH) Fabio Modica (BFH)	435791-HS2023-0 435831-HS2023-0
Solid Mechanics	Philippe Zysset (UniBE)	399219-FS2023-0
Lecture Series on Advanced Microscopy	divers	9256-HS2023-0

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