

MASTER'S DEGREE, FOREST SCIENCES, 2020-2023, 120 cr

ADVANCED STUDIES FOREST BIOECONOMY BUSINESS AND POLICY STUDY TRACK, 65 cr

After each course is the name of the course's responsible teacher.

	cr	study year
KK-ENG516/KK-ENG501 Academic writing (Language Center)	2	1-2
KK-ESP/KK-ITA/KK-KII/KK-RAN/KK-SAK/KK-VEN		
Another foreign language (CEFR B1) (Language Center)	3	1-2
FOR-001 Personal study plan (Mika Rekola)	0	1
FOR-002 Career portfolio and internship or a special project (Petri Parvinen, Juha Rikala)	5	1-2
FOR-003 Master's thesis seminar (Petri Parvinen)	5	2
FOR-004 Master's thesis (Kari Minkkinen)	30	2
FOR-101 Responsible business management in global forest bioeconomy (Anne Toppinen)	5	1
FOR-102 Economics of forest industries (N.N.)	5	1
FOR-103 Survey methods in marketing and social sciences (Sami Berghäll)	5	1-2
FOR-104 International forest policy 2 (Maria Brockhaus)	5	1
VIKIM-001 Master's maturity test	0	2

ELECTIVE ADVANCED STUDIES

FOREST BIOECONOMY BUSINESS AND POLICY STUDY TRACK, CHOOSE 35 cr

	cr	study year
FOR-105 Sales management and business models (Petri Parvinen)	5	1-2
FOR-106 Yrityksen strategia ja yrityspeli (Jussi Lintunen, Juuso Töyli)	5	1-2
FOR-107 Private forestry and forest policy (N.N.)	5	1-2
FOR-108 Qualitative empirical research methods, approaches and research ethics (Maria Brockhaus)	5	1-2
FOR-262 Forest bioenergy (Jori Uusitalo, V-P Kivinen)	5	1-2
FOR-109 Ecosystem services: A comprehensive introduction to theory and applications (Dalia D'amato)	5	1-2
FOR-110 Economics of climate change in forestry (N.N.)	5	1-2
FOR-111 Behavioural change and sustainability (Annukka Vainio)	5	1-2
FOR-112 Introduction to comparative policy research design (Maria Brockhaus)	5	1-2 (odd years)

Additional courses from Agricultural Economics, Environmental Change and Global Sustainability,
Environmental and Resource Economics, Food Economics, Marketing, according to PSP

ELECTIVE STUDIES, FOREST BIOECONOMY BUSINESS AND POLICY STUDY TRACK, 20 cr

Studies according to the PSP

For example studies abroad, language studies, tutoring

FOR-011 Tieteen popularisointi (Petri Nummi) 3-5 cr

FOR-013 Studies with changing content 1-5 cr

FOR-014 Making a scientific article 1-12 cr

FOR-015 Working as a teaching assistant 1-5 cr

FOR-016 Foresight Methods and Applications for Sustainable Use of Natural Resources 3 cr

FOR-271 Practical course in bioinformatics (Fred Asiegbu) 5 cr

VIKIM-002 Tutoring 5 cr

VIKIM-003 Orientation week 1 cr

VIKIM-005 Demanding participation in administrative bodies and student organizations 2-5 cr

VIKIM-006 Halloped training & support coaching 3 cr

VIKIM-100 Courses taken at other universities

VIKIM-200 Study module accomplished at another university

VIKIM-201 Study module accomplished abroad

MASTER'S DEGREE ALTOGETHER

120

ADVANCED STUDIES: FOREST ECOLOGY AND MANAGEMENT STUDY TRACK 81 cr

	cr	study year
KK-ENG516/KK-ENG501 Academic writing/		
KK-AKTE003 Kirjoittamisen kurssi graduntekijöille (Language Center)	2	1-2
FOR-001 Personal study plan (Kari Minkkinen)	0	1
FOR-002 Career portfolio and internship or a special project (Petri Parvinen, Juha Rikala)	5	1-2
FOR-003 Master's thesis seminar (Kari Minkkinen, Eshetu Yirdaw)	5	1-2
FOR-004 Master's thesis (Kari Minkkinen)	30	1-2
FOR-005 Advanced literature (Kari Minkkinen)	5	1-2
FOR-006 R-basic course (Teppo Mattsson)	4	1-2
FOR-007 Tilastollisia malleja: Yleistettyjen lineaaristen mallien perusteet (Teppo Mattsson)	5	1-2
VIKIM-001 Master's maturity essay	0	2
Module according to specialization	25	1-2

ELECTIVE STUDIES, FOREST ECOLOGY AND MANAGEMENT STUDY TRACK, 39 cr

Studies according to PSP

For example MEK-module, studies abroad, language studies, courses in statistics

FOR-008 Tilastollinen ennustaminen ja otanta (Teppo Mattsson) 5 cr

FOR-009 Statistical modelling with R (Teppo Mattsson) 5 cr

FOR-011 Tieteen popularisointi (Petri Nummi) 3-5 cr

FOR-013 Studies with changing content 1-5 cr

FOR-014 Making a scientific article 1-12 cr

FOR-015 Working as a teaching assistant 1-5 cr

FOR-016 Foresight Methods and Applications for Sustainable Use of Natural Resources 3 cr

FOR-271 Practical course in bioinformatics (Fred Asiegbu) 5 cr

ATM-309 Analysis of atmosphere-surface interactions and feedbacks 5 cr

VIKIM-002 Tutoring 5 cr

VIKIM-003 Orientation week 1 cr

VIKIM-005 Demanding participation in administrative bodies and student organizations 2-5 cr

VIKIM-006 Halloped training & support coaching 3 cr

VIKIM-100 Courses taken at other universities

VIKIM-200 Study module accomplished at another university

VIKIM-201 Study module accomplished abroad

MASTER'S DEGREE ALTOGETHER

120

Modules in the master's degree

FOR-100 Advanced studies in forest bioeconomy business and policy/Metsäbiotalouden liiketoiminnan ja politiikan syventävät opinnot (Mika Rekola)

FOR-309 Advanced studies in Forest ecosystem function and environmental change/Metsäekosysteemien toiminnan ja ympäristömuutoksen syventävät opinnot (Heljä-Sisko Helmisaari)

FOR-310 Advanced studies in Forest production and ecosystem services/Metsien tuotoksen ja ekosysteemipalveluiden syventävät opinnot (Annikki Mäkelä)

FOR-311 Advanced studies in Forest resilience, diversity and wildlife/Metsien häiriönsietokyvyn, monimuotoisuuden ja riistanhoidon syventävät opinnot (Fred Asiegbu)

FOR-208 Advanced studies in forest resource management and geoinformatics/Metsävarojen hallinnan ja geoinformatiikan syventävät opinnot (Markus Holopainen)

FOR-209 Advanced studies in forest operations and supply management/Metsäteknologian ja logistiikan syventävät opinnot (Jori Uusitalo)

FOR-210 Advanced studies in wood technology/Puuteknologian syventävät opinnot (Marketta Sipi)

VIKIM-301 other studies in the master's degree (include electives 20 cr/39 cr)

MODULES ACCORDING TO SPECIALIZATION

FOREST ECOLOGY AND MANAGEMENT STUDY TRACK 25 cr

Choose at least one of the following modules

Forest ecosystem function and environmental change/Metsäekosysteemien toiminta ja ympäristönmuutos 25 cr

<u>Theory and methods, choose at least 10 cr</u>	<u>cr</u>	<u>study year</u>
FOR-217 Forests and peatlands as modifiers of atmospheric composition (Jaana Bäck)	5	
FOR-227 Methods to study forest soils (Kristiina Karhu)	5	
FOR-223 Ecology of peatlands (Harri Vasander)	5	(even years)
FOR-218 Basics of biometeorology (Teemu Hölttä)	3/5	
FOR-275 Soils and Climate Change (Kristiina Karhu)	5	(odd years)
FOR-228 Forest ecosystem biogeochemistry (Heljä-Sisko Helmisaari)	5	

<u>Applications, choose at least 10 cr</u>	<u>cr</u>	<u>study year</u>
FOR-215 Mitigation of climate change in forestry (Jaana Bäck)	5	
FOR-225 Turpeen käyttö Suomessa - tavoitteet ja ristiriidat (Harri Vasander)	5	(even years)
FOR-226 Restoration of degraded ecosystems: theory and practice (N.N.)	5	(odd years)
FOR-261 Environmental effects of forest operations (Jori Uusitalo)	5	
FOR-262 Forest bioenergy (Jori Uusitalo, V-P Kivinen)		5

Forest production and ecosystem services/Metsien tuotos ja ekosysteemipalvelut 25 cr

<u>Theory and methods, choose at least 10 cr</u>	<u>cr</u>	<u>study year</u>
FOR-211 Tree ecophysiology (Albert Porcar Castell)	5	
FOR-212 Forest production, growth and yield (Annikki Mäkelä)	5	
FOR-230 Forest soil and root ecology (Jussi Heinonsalo)	5	(even years)
FOR-214 Simulation of forest growth with ecological models (Annikki Mäkelä)	5	(even years)
FOR-247 Methods and tools in tropical forestry (Eshetu Yirdaw)	5	(even years)
FOR-248 Field course: tropical forests and agroforests (Eshetu Yirdaw)	5	(odd years)

<u>Applications, choose at least 10 cr</u>	<u>cr</u>	<u>study year</u>
FOR-216 Adaptation of forestry to climate change (Jaana Bäck)	5	(odd years)
FOR-219 Sustainable forest ecosystem management (Timo Kuuluvainen)	5	
FOR-220 Monitavoitteisen metsänhoidon menetelmät (Pasi Puttonen)	5	
FOR-221 Advanced silviculture (Pasi Puttonen)	5	
FOR-222 Taajama- ja virkistysalueiden metsien hoito (Pasi Puttonen)	5	
FOR-224 Soiden luonnonvarasuunnittelun kenttäkurssi (Kari Minkkinen)	5	(odd years)
FOR-253 Tropical forests and climate change (Eshetu Yirdaw) MOOC	5	(odd years)

FOR-276 Sustainable forestry and agroforestry in the tropics (Eshetu Yirdaw)	5
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Forest resilience, diversity and wildlife/Metsien häiriönsietokyky, monimuotoisuus ja riistanhoito 25 cr

Theory and methods, choose at least 10 cr	cr	study year
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FOR-272 Herbivoria (Päivi Lyytikäinen-Saarenmaa)	5	(odd years)
FOR-274 Metsäentomologian syventävä lajintuntemus ja oma kokoelma (Päivi Lyytikäinen-Saarenmaa)	5	
FOR-238 Alien species (Petri Nummi, Eshetu Yirdaw)	4	(even years)
FOR-242 Riistaeläintieteen syventävä lajintuntemus (V-M Väänänen)	3	
FOR-233 Advanced forest mycology & pathology (Fred Asiegbu)	10	
FOR-232 Forest microbiology (Fred Asiegbu)	10	

Applications, choose at least 10 cr	cr	study year
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FOR-231 Basic biotechnology applications in forestry (Fred Asiegbu)	5	
FOR-235 Insect outbreaks and disturbance dynamics (Päivi Lyytikäinen-Saarenmaa)	5	(odd years)
FOR-273 Forest health and ecosystem services (Päivi Lyytikäinen-Saarenmaa)	5	(even years)
FOR-246 Riistaeläintieteen ajankohtaiskysymykset (Petri Nummi, V-M Väänänen)	2	
FOR-243 Riistatalouden suunnittelu (V-M Väänänen)	3	(odd years)
FOR-244 Riista ja yhteiskunta (Petri Nummi)	2	(even years)
FOR-245 Riistatarhaus (Petri Nummi, V-M Väänänen)	2	
EEB-104 Nisäkäsekologian kenttäkurssi (Janne Sundell)	5	(odd years)

Forest Resource Management and Geoinformatics/Metsävarojen hallinta ja geoinformatiikka 25 cr

Compulsory course 10 cr	cr	study year
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FOR-254 Metsävarojen inventointi- ja suunnitteluprojekti (Ilkka Korpela) (Can be completed in English)	10	1-2 (even years)
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Choose at least 15 cr of the following

FOR-255 Metsien kehityksen simulointi (Jari Vauhkonen)	5	1-2 (odd years)
FOR-256 Metsävarojen hallinnan ja geoinformatiikan vaihtuvaisältöiset erikoistumisopinnot (Markus Holopainen)	1-5	1-2
FOR-257 Multi-attribute forest planning (Jari Vauhkonen)	5	1-2 (even years)
FOR-263 Operations research in forest resource management (Jari Vauhkonen, V-P Kivinen)	5	1-2 (even years)
FOR-258 GIS-analyysi ja mallinnus (Markus Holopainen)	5	1-2 (even years)

FOR-259 GIS and RS in environmental and land use applications (Markus Holopainen)	5	1-2 (odd years)
FOR-260 Metsien kaukokartoituksen jatkokurssi (Markus Holopainen)	5	1 (odd years)

Recommended in Forest resource management and geoinformatics:

FOR-007 Tilastollisia malleja: Yleistettyjen lineaaristen mallien perusteet (Teppo Mattsson) 5 cr

FOR-008 Tilastollinen ennustaminen ja otanta (Teppo Mattsson) 5 cr

FOR-009 Statistical modelling with R (Teppo Mattsson) 5 cr

Forest operations and supply management /Metsäteknologia ja logistiikka 25 cr

Choose at least 25 cr of following	cr	study year
FOR-261 Environmental effects of forest operations (Jori Uusitalo)	5	1-2
FOR-262 Forest bioenergy (Jori Uusitalo, V-P Kivinen)	5	1-2
FOR-263 Operations research in forest resource management (Jari Vauhkonen, V-P Kivinen)	5	1-2 (even years)
FOR-264 Logistics and supply chain management (Jori Uusitalo)	5	1-2
FOR-265 Terramekaniikka (Jori Uusitalo)	5	1-2 (even years)
FOR-266 Wood Procurement – Supply chain and information management (Jori Uusitalo)	5	1 (odd years)

Wood Technology/Puuteknologia 25 cr

Compulsory courses 20 cr	cr	study year
FOR-267 Wood science (Juha Rikala)	5	1-2
FOR-268 Metsäteollisuuden laboratoriotyöt (Juha Rikala)	5	1-2
FOR-269 Puu rakennus- ja huonekalumateriaalina (Marketta Sipi)	5	1-2
FOR-270 Wood as fibre raw material (Juha Rikala)	5	1 (even years)

Choose at least 5 cr of following	cr	study year
FOR-262 Forest Bioenergy (Jori Uusitalo, V-P Kivinen)	5	1-2
FOR-101 Responsible business management in global forest bioeconomy (Anne Toppinen)	5	1-2
FOR-102 Economics of forest industries (N.N.)	5	1-2
FOR-106 Yrityksen strategia ja yrityspeli (N.N., Juuso Töyli)	5	1-2

MODULES OFFERED FOR OTHER DEGREE PROGRAMMES

FOR-301 Module in Geoinformatics/Geoinformatiikan opintokokonaisuus (Markus Holopainen)
FOR-302 Module in Tropical Forestry/Trooppisen metsänhoidon opintokokonaisuus (N.N.)
FOR-303 Module in Peatland Ecology and Management/Soiden ekologian ja käytön opintokokonaisuus (Harri Vasander)
FOR-304 Module in Forest Soil Sciences/Metsämaatiikkeen opintokokonaisuus (Heljä-Sisko Helmisaari)
FOR-305 Module in Forests and Climate change/Metsien ja ilmastomuutoksen opintokokonaisuus (Jaana Bäck)
FOR-306 Module in Forest biotechnology/Metsäbioteknologian opintokokonaisuus (Fred Asiegbu)
FOR-312 Module in Forest production ecology/Metsien tuotosekologian opintokokonaisuus (Annikki Mäkelä)
FOR-308 Module in management and restoration of forest and peatland ecosystems/ Metsä- ja suoekosysteemien hoidon ja ennallistamisen opintokokonaisuus (Pasi Puttonen, Harri Vasander)

Module in Geoinformatics/ Geoinformatiikan opintokokonaisuus 25 cr

Choose at least 25 cr of following	cr	timing
ME-203 Geoinformatiikka 1/ME-204 Geoinformatics 1	5	web course
ME-230 Geoinformatiikka 2	5	
ME-231 Open GIS and spatial data infrastructures	5	web course
ME-232 Kaukokartoitus 1	5	
ME-234 Basics in object-oriented programming in forest sciences	5	
FOR-258 GIS-analyysi ja mallinnus	5	(even years)
FOR-259 GIS and RS in environmental and land use operations	5	(odd years)
FOR-260 Metsien kaukokartoituksen jatkokurssi	5	(odd years)
GEOG-406 GIS in society (course in geography degree programme)	5	
GEOG-323 Remote sensing 2 (course in geography degree programme)	5	

Module in Tropical Forestry/Trooppisen metsänhoidon opintokokonaisuus 25 cr

Choose at least 25 cr of the following	cr	timing
ME-226 Agriculture, agroforestry and forestry in the tropics	5	
ME-227 Agroforestry 1 - Introduction to tropical agroforestry	5	
ME-228 Tropical forest ecology and conservation	5	
ME-229 Introduction to tropical forestry	5	
FOR-247 Methods and tools in tropical forestry	5	(even years)
FOR-253 Tropical forests and climate change	5	(odd years)
FOR-276 Sustainable forestry and agroforestry in the tropics	5	(even years)

Module in Peatland Ecology and Management/Soiden ekologian ja käytön opintokokonaisuus 25 cr

Choose at least 25 cr of the following	cr	timing
ME-201 Metsämaiden ominaisuudet, prosessit ja kasvupaikkaluokittelu	5	
ME-013B Metsätieteiden kenttäkurssi: metsä- ja suoekologia ja metsänhoito	6	
ME-216 Soiden ekohydrologia ja kasvillisuus	5	(odd years)
ME-217 Ojitusalue metsien hyödyntäminen: mahdollisuudet ja ongelmat	3	(odd years)
FOR-223 Ecology of Peatlands	5	(even years)
FOR-224 Soiden luonnonvarasuunnittelun kenttäkurssi	5	(odd years)
FOR-225 Turpeen käyttö Suomessa - tavoitteet ja ristiriidat	3	(even years)

Module in Forest Soil Sciences/ Metsämaatielten opintokokonaisuus 25 cr

Choose at least 25 cr of the following	cr	timing
ME-201 Metsämaiden ominaisuudet, prosessit ja kasvupaikkaluokittelu	5	
ME-013B Metsätieteiden kenttäkurssi	6	
FOR-227 Methods to study forest soils	5	
FOR-228 Forest ecosystem biogeochemistry	5	
FOR-230 Forest Soil and root ecology	5	(even years)
AGRI-414 Pedogenesis and soil classification	3	
or other courses according to PSP		

Module in Forests and Climate Change/Metsien ja ilmastomuutoksen opintokokonaisuus 25 cr

Compulsory courses 17-19 cr	cr	
ME-210 Puiden aineenvaihdunta, kasvu ja rakenne	4	
FOR-211 Tree ecophysiology	5	
ME-211 Systeemanalyysi metsätieteissä	5	
Choose one of the following:		
FOR-218 Basics of biometeorology	3 or 5	
ATM-347 Rajakerroksen fysiikka 1 (Kumpula campus)	5	
Choose at least 6-8 cr of the following	cr	timing
FOR-215 Mitigation of climate change in forestry	5	(even years)
FOR-216 Adaptation of forestry to climate change	5	(odd years)
FOR-217 Forests and peatlands as modifiers of atmospheric composition	5	
ATM-332 Terrestrial water, carbon and nitrogen cycles (Kumpula campus)	5	
FOR-253 Tropical forests and climate change	5	(odd years)
ATM-302 Climate change now	2/5	

Module in Forest Biotechnology/Metsäbioteknologian opintokokonaisuus 30 cr

Compulsory courses	cr
FOR-231 Basic biotechnology applications in forestry	5
PBIO-112 Wood structure, growth and differentiation	5
FOR-232 Forest microbiology	10
FOR-233 Advanced forest mycology & pathology	10

Module in Forest Production Ecology/Metsien tuotosekologian opintokokonaisuus 15 cr

Compulsory courses	cr	timing
FOR-211 Tree ecophysiology	5	
FOR-212 Forest production, growth and yield	5	
One of the following:		
FOR-215 Mitigation of climate change in forestry	5	(even years)
FOR-216 Adaptation of forestry to climate change	5	(odd years)

FOR-308 Module in management and Restoration of Forest and Peatland Ecosystems/ Metsä- ja suoekosysteemien hoidon ja ennallistamisen opintokokonaisuus 25 cr

Choose at least 25 cr of the following	cr	timing
FOR-219 Sustainable forest ecosystem management	5	
FOR-220 Monitavoitteisen metsänhoidon menetelmät	5	
FOR-221 Advanced silviculture	5	
FOR-222 Taajama- ja virkistysalueiden metsien hoito	5	
FOR-223 Ecology of peatlands	5	(even years)
FOR-224 Soiden luonnonvarasuunnittelun kenttäkurssi	5	(even years)
FOR-225 Turpeen käyttö Suomessa - tavoitteet ja ristiriidat	5	(even years)
FOR-226 Restoration of degraded ecosystems: Theory and practice	5	(odd years)
FOR-262 Forest bioenergy	5	