

## 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.

	<b>cr</b>	<b>study year</b>
KK-ENG516/KK-ENG501 Academic writing (Language Center) KK-ESP/KK-ITA/KK-KII/KK-RAN/KK-SAK/KK-VEN	2	1-2
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 (Mika Rekola)	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

	<b>cr</b>	<b>study year</b>
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 (Heimo Karppinen)	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 (Mika Rekola)	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

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Studies according to the PSP

For example studies abroad, language studies, tutoring, forest sciences courses from forest ecology and management study track (ME-201-ME-241, FOR-211-FOR-276)

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

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**MASTER'S DEGREE ALTOGETHER**

**120**

## ADVANCED STUDIES: FOREST ECOLOGY AND MANAGEMENT STUDY TRACK 81 cr

	<b>cr</b>	<b>study year</b>
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**

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Studies according to PSP

For example a module from forest ecology and management, studies abroad, language studies, courses in statistics, courses from forest bioeconomy business and policy study track (ME-101-ME-107, FOR-101-FOR-112)

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  
VIIKM-002 Tutoring 5 cr  
VIIKM-003 Orientation week 1 cr  
VIIKM-005 Demanding participation in administrative bodies and student organizations 2-5 cr  
VIIKM-006 Halloped training & support coaching 3 cr  
VIIKM-100 Courses taken at other universities  
VIIKM-200 Study module accomplished at another university  
VIIKM-201 Study module accomplished abroad

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**MASTER'S DEGREE ALTOGETHER**

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### **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)  
VIIKM-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

<b>Theory and methods, choose at least 10 cr</b>	<b>cr</b>	<b>study year</b>
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 (Jussi Heinonsalo)	5	

<b>Applications, choose at least 10 cr</b>	<b>cr</b>	<b>study year</b>
FOR-215 Mitigation of climate change in forestry (Jaana Bäck)	5	(even years)
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 ekosysteempalvelut 25 cr

<b>Theory and methods, choose at least 10 cr</b>	<b>cr</b>	<b>study year</b>
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)

<b>Applications, choose at least 10 cr</b>	<b>cr</b>	<b>study year</b>
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	

### Forest resilience, diversity and wildlife/Metsien häiriönsietokyky, monimuotoisuus ja riistanhoito 25 cr

#### Theory and methods, choose at least 10 cr

	cr	study year
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
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
FOR-254 Metsävarojen inventointi- ja suunnitteluprojekti (Ilkka Korpela) (Can be completed in English)	10	1-2 (even years)

#### 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**

<u>Choose at least 25 cr of following</u>	<u>cr</u>	<u>study year</u>
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**

<u>Compulsory courses 20 cr</u>	<u>cr</u>	<u>study year</u>
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)

<u>Choose at least 5 cr of following</u>	<u>cr</u>	<u>study year</u>
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 (Mika Rekola)	5	1-2
FOR-106 Yrityksen strategia ja yrityspeli (Mika Rekola, 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 (Edward Webb)  
FOR-303 Module in Peatland Ecology and Management/Soiden ekologian ja käytön opintokokonaisuus (Harri Vasander)  
FOR-304 Module in Forest Soil Sciences/Metsämaatiieteen opintokokonaisuus (Jussi Heinonsalo)  
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

<b>Choose at least 25 cr of following</b>	<b>cr</b>	<b>timing</b>
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

<b>Choose at least 25 cr of the following</b>	<b>cr</b>	<b>timing</b>
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**

<b>Choose at least 25 cr of the following</b>	<b>cr</b>	<b>timing</b>
ME-201 Metsämaiden ominaisuudet, prosessit ja kasvupaikkuokittelu	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**

<b>Choose at least 25 cr of the following</b>	<b>cr</b>	<b>timing</b>
ME-201 Metsämaiden ominaisuudet, prosessit ja kasvupaikkuokittelu	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**

<b>Compulsory courses 17-19 cr</b>	<b>cr</b>	
ME-210 Puiden aineenvaihdunta, kasvu ja rakenne	4	
FOR-211 Tree ecophysiology	5	
ME-211 Systemianalyysi metsätieteissä	5	
<b>Choose one of the following:</b>		
FOR-218 Basics of biometeorology	3 or 5	
ATM-347 Rajakerroksen fysiikka 1 (Kumpula campus)	5	
<b>Choose at least 6-8 cr of the following</b>	<b>cr</b>	<b>timing</b>
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**

<b>Compulsory courses</b>	<b>cr</b>
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**

<b>Compulsory courses</b>	<b>cr</b>	<b>timing</b>
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**

<b>Choose at least 25 cr of the following</b>	<b>cr</b>	<b>timing</b>
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	