KØBENHAVNS UNIVERSITET

Uddannelsesevaluering

Kandidatuddannelser

Uddannelsens navn	Environmental Science
Evalueringsår (og evalueringsperiode)	Evalueringsår: 2018 Evalueringsperiode: 2011-2017 Bemærk dataperiode: 2015-2017
Studieleder	Nina Cedergreen
Viceinstitutleder for undervisning	Kirsten Jørgensen
Institutleder	Svend Christensen
Institut	Institut for Plante- og Miljøvidenskab
Fakultet	Det Natur- og Biovidenskabelige Fakultet
Dato for dekanens godkendelse	D. 30. august 2018

Indholdsfortegnelse

Indholdsfortegnelse

Dataoversigt

Baggrundsdata

Kvantitativt datamateriale	Periodens resultater		
	Opgørelsesår: 2015	Opgørelsesår: 2016	Opgørelsesår: 2017
Bestand seneste tre år	46	73	90
Antal grader seneste tre år	11	12	20
Antal udrejsende udveksling seneste tre år	3	2	10

Kvantitativt og kvalitativt datamateriale

Kvantitativt datamateriale	Periodens resultater			Standarder for kvalitet
	Opgørelses-år: 2015	Opgørelses-år: 2016	Opgørelses-år: 2017	
Optag senest tre år	20	40	41	Mindst 25
Frafald seneste tre år i procent og (og antal i procent)	22 % (4)	0 % ()	14 % (2)	Højest 12 % i 2017
Gennemførelse, normeret tid seneste tre år i procent (og antal i parentes)	17 % (3)	18 % (2)	43 % (6)	Mindst 25 % i 2017
Gennemførelse, normeret tid + et år seneste tre år i procent (og antal i parentes)	61 % (11)	91 % (10)	79 % (11)	Mindst 78 % i 2017
Gennemsnitlig studietid	2,4 år	2,4 år	2,3 år	Højest 2,5 år i 2017
Studieprogression, gennemsnitligt antal ECTS-point pr. studerende pr. år seneste tre år	39,8	42,4	50	Mindst 42 ECTS i 2017
ViP/DViP-ratio, årsværk, seneste år			61,3	Mindst 5,1
STÅ/ViP-ratio, årsværk, seneste år			6,2	Højest 25

Antal optagne internationale studerende på kandidatuddannelsen (full degree) seneste tre år	8	26	32	Mellem 10% og 50%
Ledighedsstatistik seneste tre år i procent (og antal dimittender i parentes)	**Dimissions-år: 2013** 19 % (12)	**Dimissions-år: 2014** 7 % (17)	**Dimissions-år: 2015** 8 % (12)	Højest 12 % i gns. for dimissionsårgang 2011-15
Kvalitativt datamateriale	**Periodens resultater**			**Standarder for kvalitet**
Studiestart – hele perioden (seks år)	Afrapporteres i forbindelse med DAU.			
Kompetencematrix, kandidat, jf. bilag 1	Se analyseafsnittet nedenfor.			
Forskningsmatrix, kandidat, jf. bilag 2	Se analyseafsnittet nedenfor.			

Analyse

Status for uddannelsen

Status for uddannelsen baseret på analyse af kvantitativt og kvalitativt datamateriale inklusive kompetencematrix og forskningsmatrix

Overblik
Uddannelsen i Environmental Science er blevet mere fokuseret med den nye studieordning i 2015. I 2016 fik uddannelsen et meget retvisende navn – Environmental Science i stedet for Environmental Chemistry and Health. Samtidig flyttede EnvEuro-specialiseringen fra Agriculture til denne uddannelse, og gav det en større bredde inden for miljøuddannelsen. Derfor inkluderer datamaterialet fra 2016 og fremad ligeledes EnvEuro specialiseringen.

Uddannelsen har udviklet sig og lever i 2017 op til de statistiske kvalitetskriterier med undtagelse af frafald. Frafaldet svinger fra 0 til 22 % for de tre år, der er præsenteret her. Det høje frafald i 2015 kan evt. skyldes, at uddannelsens navn signalerede et andet fagligt indhold. I 2017-opgørelsesåret ligger frafaldet på 14% frem for de ønskede <12%.
Efter sammenlægningen med EnvEuro lever uddannelsen ikke op til de målbare standarder om andelen af internationale studerende. Den er her på 78%, hvilket er langt over de maximalt ønskede 50%. For EnvEuro-specialiseringen er det en del af denne specialiserings identitet, at der er mange udlændinge på uddannelsen, da det er obligatorisk, at alle studerende på 2.år skal være på et andet universitet. At tiltrække danske studerende til uddannelsen, som er villige til at rejse ud som del af deres kandidatuddannelse er en udfordring for ChemTox-specialiseringen.

Baggrundsdata

Bestand de sidste 3 år:
Bestanden fra 2016 inkluderer ligeledes EnvEuro-specialiseringen. Det er derfor først i 2017, at en retvisende bestand fremgår, da der her er en bestand for EnvEuro for 2 år – hvilket er på omkring 90 studerende for begge specialiseringer.

Antal af grader de sidste 3 år:
De uddelte grader for ChemTox-specialiseringen har ligget stabilt på omkring 11 hvert år. I 2017 inkluderer antallet af grader ligeledes de første kandidater fra EnvEuro specialiseringen.

Antal udrejsende udveksling seneste 3 år:
Der er få studerende, der tager en periode i udlandet for ChemTox-specialiseringen. Baggrunden for at der er 10 udrejsende i 2017 er, at det er en obligatorisk del af EnvEuro specialiseringen at 2.år skal foregå på et af partneruniversiteterne.

Kvantitativt og kvalitativt datamateriale

Optag seneste tre år:
Optag i 2015 er for Environmental Chemistry and Health, hvor optaget for 2016 og 2017 inkluderer EnvEuro, som er overflyttet til Environmental Science netop i 2016. Fra 2016 ligger optaget stabilt på ca. 40 studerende.

Frafald seneste tre år:
Frafaldet har varieret gennem de sidste tre år. I 2015 var det oppe på 22%, herefter er frafaldet blevet meget mindre. I 2015 kom en ny studieordning og i 2016 et navneskift, der er mere retvisende. Det kan være, at frafaldet opgjort i 2015 skyldes at "sundhed" tidligere indgik i uddannelsens titel, men at dette kun var en mindre del af uddannelsen. Frafaldet opgjort i 2017 ligger lige under standarden, det er dog kun med 1 person.

Gennemførsel, normeret tid seneste tre år:
Det tyder på, at den nye studieordning har haft en positiv indvirkning på gennemførelses-procenten. Den har forbedret sig markant i opgørelsesåret 2017. Studieordningen af 2015 har fastlagt et uddannelsesforløb med mange obligatoriske kurser, der skal sikre det faglige indhold af og progression i uddannelsen. Dette fremgår også af dimittendanalysen, at en stor del mener, at de planlagte elementer i uddannelsen understøtter, at man færdiggør på normeret tid.

Gennemførelse, normeret tid + et år:
Det fremgå af disse data, at de fleste studerende bliver færdige på normeret tid + et år. Dette gælder også for opgørelsen i 2016 og fremefter.

Gennemsnitlig studietid:
Den gennemsnitlige studietid følger standarden.

Studieprogression, gennemsnitlig antal ECTS-point pr. studerende pr år, de seneste tre år:
Det tyder på, at den nye studieordning har haft en positiv indvirkning på studieprogressionen, målt ved det gennemsnitlige antal ECTS-point pr. år. Studieordningen af 2015 har fastlagt et uddannelsesforløb med mange obligatoriske kurser, der skal sikre det faglige indhold og progression i uddannelsen.

ViP/DViP-ratio, årsværk seneste tre år:
Som det også fremgår af forskningsmatrixen foretages undervisningen af forskningsaktive ansatte. Der er meget få DViP.

STÅ/ViP-ratio, årsværk, seneste tre år:
Studenterårsværk pr. underviser ligger fornuftigt og afspejler de mange undervisere, der er involveret, og antallet af konfrontationstimer.

Antal optagne internationale studerende på kandidatuddannelsen (full degree) seneste tre år:
Efter sammenlægningen med EnvEuro lever uddannelsen ikke op til de målbare standarder om andelen af internationale studerende, den er her på 78%, hvilket er langt over de maximalt ønskede 50%. Stigningen i antal internationale studerende skyldes blandt andet at fra 2016 indgår specialisering EnvEuro i Environmental Science-uddannelsen. EnvEuro's særkende er, at de studerende skal tage 2.år på et andet af de partneruniversiteter, der indgår i dette uddannelsessamarbejde. At tiltrække danske studerende til uddannelsen, som er villige til at rejse ud som del af deres kandidatuddannelse er en udfordring for ChemTox-specialiseringen. Erfaringen blandt underviserne viser, at det er vigtigt, at andelen af danske studerende øges. Det giver det bedste studiemiljø og er med til at sikre, at de internationale studerende får et bedre kendskab til det danske undervisnings- og uddannelsessystem.

Ledighedsstatistik seneste tre år:
Ledighedsstatistikken viser i løbet af de tre perioder, hvor det er blevet opgjort, at de færdige kandidater får ansættelse.

Undervisningsevalueringer
Alle undervisningsevalueringer af de obligatoriske kurser er overvejende positive (se uddybning i bilag 4 – Særlige opmærksomhedspunkter).

Mht. undervisningsevalueringerne for de 6 obligatoriske kurser på ChemTox er de alle positive. Alle undervisningsevalueringer bliver diskuteret i Fagkyndigt Råd på et af de to møder, der afholdes hvert år. Dette sikrer ligeledes, at alle undervisere på de obligatoriske kurser er opdaterede på udviklingen i de andre kurser og at eventuelle koordineringer og tilpasninger af den faglige progression mellem kurserne kan justeres og tilpasses.

M.h.t. EnvEuro bliver det obligatoriske 15 ETCS-pointskursus Environmental Management in Europe generelt vurderet godt. De resterende kurser, som ligger i kursuspakkerne, udbydes på de fire universiteter og er alle underlagt en evalueringsprocedure på hvert af de fire universiteter. Kvalitetssikringsprocedurerne er meget ens i struktur og kriterier der benyttes, som dem vi har på KU.

Alle EnvEuro studerende skal obligatorisk studere 1 år i udlandet, og evalueringernes placering på året afspejler i nogen grad det sædvanlige mønster for udstationerede folk: ”honeymoon – kulturchok – tilpasning – beherskelse” både når de er ude og efter hjemkomst til hjemuniversitet. Evalueringerne viser derfor ikke altid kun kursernes kvalitet, men siger i lige så høj grad noget om, hvor de studerende er som personer i de studieforløb kurserne ligger.

Aftagerpanel
En undersøgelse af, hvilke kursuskompetencer fra ChemTox-specialiseringen som aftagerne følte var ”need to have” versus ”nice to have” eller ”unødvendige” blev foretaget i 2013 på baggrund af de studerendes ønske om mere valgfrihed.
Undersøgelsen viste klart, at alle aftagere fra forskellige sektorer vurderede alle kompetencerne opnået i de obligatoriske kurser som ”Need to have”. Hvis de ville have folk, der var stærke i kemi, ville de alligevel vælge en kemiker, ligesom de ville vælge en biolog, hvis de skulle have stærke økologer/toksikologer. De understregede på det opfølgende møde, at det var kombinationen af viden om miljøkemi og toksikologi/økotoksikologi kombineret med evnen til at sætte den viden i et regulatorisk perspektiv, som gjorde vores kandidater til noget særligt og til noget attraktivt. Denne viden blev benyttet ved den nye studieordning i 2015 og sammensætningen af de faglige elementer i de obligatoriske kurser er blevet fastholdt.

Mht. EnvEuro er der opbakning til at fortsætte med de 100% mobilitet, som er en del af programmet. Den indbyggede mobilitet giver de studerende et unikt udsyn, kulturforståelse og en personlig tilpasningsevne til forskelige studie- og arbejdskulturer, der er attraktivt for aftagerne.

Censorformandskabsberetning
Censorformandskabsberetningerne har ikke givet anledning til ændringer eller kommentarer.

Dimittendundersøgelse
Der er lav ledighed for kandidaterne, som det også fremgår af dimittendanalysen. Af de personer der har svaret på dimittendanalysen er ca. halvdelen ansat i virksomheder (43%) og halvdelen (43%) i gang med et ph.d.-forløb. Kandidaterne får deres første job, inden der er gået et halvt år

efter de er færdige med uddannelsen. De bliver hovedsageligt ansat i hovedstaden, 60% i private virksomheder og 40% i offentlige virksomheder. Dimittender får job i en lang række virksomheder såsom Biogen Idec, Det nationale forskningscenter for arbejdsmiljø og Sweco. De jobfunktioner, de varetager er blandt andet produktion, formidling og kommunikation, udviklingsopgaver og administration (sagsbehandling). Med hensyn til de kandidater, der fortsætter med et ph.d.-forløb, er 90% ansat på KU, hvor de fortsætter inden for det faglige område, som uddannelsen dækker.

Dimittenderne vurderer, at uddannelsen ruster dem til arbejdsmarkedet (29% i høj grad og 67% i nogen grad). Dog efterspørger de, at der er flere muligheder for at løse opgaver og projektforløb i samarbejde med virksomheder og organisationer igennem uddannelsen. Det skal dog samtidig ses i lyset af, at de studerende allerede mener, at de opnår top-kompetencer inden for at arbejde projektorienteret, reflektere kritisk over komplekse problemstillinger, tilegne sig ny viden, samarbejde på tværs af faggrupper og opnår metodisk viden inden for området. De kompetencer, hvor dimittenderne vurderer, at de opnår færrest kompetencer er inden for IT-færdigheder, formidling og økonomi, ledelse og organisation.

Dimittendernes vurdering af uddannelsen er, at den er tilrettelagt på et passende niveau i forhold til de kompetencer, de studerende har med fra deres bacheloruddannelse, og at uddannelsens elementer er værdifulde og bidrager til, at de lærer de nødvendige kompetencer og færdigheder.

Undervisernes faglige kompetencer fremhæves af dimittenderne, som vurderer at 79% i høj grad og 21% i nogen grad har de tilstrækkelige faglige kompetencer. Med hensyn til de pædagogiske kompetencer er de stadig vurderet meget positivt, dog er der kun 16% der vurderer, at de i høj grad og 74% at de er i nogen grad besidder tilstrækkelige kompetencer.

Kandidaterne følges via LinkedIn, som samtidig fungerer som et alumnenetværk. Denne LinkedIn-profil for alumner viser ligeledes meget lav ledighed og stor beskæftigelse inden for målgruppe-professionerne og understøtter de resultater som dimittendundersøgelsen kommer frem til. Ifølge LinkedIn tager ca. 1/3 en ph.d. og fortsætter ofte inden for forskning og udvikling på universiteter eller i firmaer, 1/3 får job i rådgivende ingeniørfirmaer og ca. 1/3 sidder i styrelser, uddannelsesstillinger. De fleste af de internationale kandidater fortsætter i job i Danmark.

Kompetencematrix
ChemTox-specialiseringen
Alle kompetencerne nævnt i studieordningen er dækket af de seks obligatoriske kurser samt i specialet for ChemTox-specialiseringen.

EnvEuro-specialiseringen
EnvEuro specialiseringen er sammensat af kursuspakker (semesterpakker) udvalgt for de fagområder som hvert universitet er stærke indenfor. Kompetencematricen for hver profiler på EnvEuro-specialiseringen er samlet omkring udvalgte kernekurser i hver profil, og de tre udenlandske partnere er udvalgt på baggrund af deres centrale ekspertområder, som driver den pågældende profil.

Forskningsmatrix
ChemTox-specialiseringen
Alle emnerne, der bliver undervist i på de obligatoriske kurser på ChemTox, er funderet i stærke forskningsmiljøer. Uddannelsen er tværfakultær. Dog er der i tidens løb sket ændringer i hvor stor andel fakulteter på KU og nationale forskningsinstitutioner har haft på uddannelsen.
I løbet af de senere års er deltagelsen af følgende partnere ændret: Arbejdsmiljøinstituttet som samarbejdspartner (2014), DTU (2015) og FARMA (2017). Dette har reduceret antallet af videnskabelige miljøer, der forsker i henholdsvis humantoksikologi (Arbejdsmiljøinstituttet og FARMA) og økotoksikologi (DTU). Disse kompetencer findes nu kun på Folkesundhedsvidenskab inden for toksikologi (http://www.ifsv.ku.dk/afdelinger/ms/partikler_hovedside/) og på PLEN inden for økotoksikologi (http://plen.ku.dk/english/research/env_chem_phys/et/). Dette har ligeledes været med til at der blev søgt om nyt navn til uddannelsen (Environmental Science).

Fremadrettet vil Martin Hansen, AU (DCE) (http://pure.au.dk/portal/en/persons/martin-hansen(d98727b1-a252-499c-bc06-c414a4b0a01e).html) være medunderviser på kurset Toxicology & Ecotoxicology med start i 2018. Dette vil give de studerende mulighed for specialer inden for humantoksikologi og økotoksikologi.

EnvEuro-specialiseringen
Partner universiteterne i EnvEuro er beskrevet i vedlagte link med oversigt over, hvilke specialiseringer (profiler) hvert universitet udbyder i EnvEuro. Specialiseringsværtsskab er valgt efter hvor man har stærke forskningsmiljøer: http://enveuro.eu/master-programme/universities/

Status for opfølgningspunkter og/eller opfølgningsplaner

Status for opfølgningsplaner for den seneste uddannelsesevaluering, status på initiativer der blev igangsat efter uddannelsesredegørelsen 2017 etc.
1. Status for opfølgningsplan (evt. tidligere uddannelsesevaluering)
Ingen tidligere uddannelsesevaluering
2. Status for opfølgningspunkter (tidligere uddannelsesredegørelse(r))
A. Rekruttering af danske studerende Med den store andel af internationale studerende er det en af udfordringerne, hvordan man rekrutterer flere danske studerende. Det tyder på, at der med tider er kommet flere danske studerende. Det er vigtigt at forskellene på kandidatuddannelser fremgår tydeligt for de kommende studerende, så de kan vælge den for den rigtige uddannelse som f.eks. "Agronomy – Environment" (KU-SCIENCE),"Environmental Engineering" (DTU),"Environmental Biology" (RUC og SDU). **B. Gennemførelsestid** Gennemførelsestiden har i de sidste tre års opgørelser ligget på 2,3 år - 2,4 år, hvilket er under den fastsatte målsætning på 2,5 år. Det lever derfor op til de kvalitetskrav der er på SCIENCE.

C. Sammenhæng mellem EnvEuro og resten af uddannelsen

Flere kurser indgår som begrænset valgfrie i begge specialiseringer. De studerende får derfor et netværk på tværs af specialiseringerne, når de tager disse fælles BV kurser.

EnvEuro er dog speciel, da der samtidig skal opbygges et sammenhold og samarbejde med de studerende og forskningsmiljøerne på samarbejdsuniversiteterne. Dette giver rigtigt meget mening, da alle studerende skal tage deres andet år på et partneruniversitet. Derfor vil et stærk netværk mellem de studerende på EnvEuro prioriteres højt, da de tilbringer deres andet år på et af samarbejdsuniversiteterne og derfor sammen med andre der har taget det første år et af de andre steder.

Visioner og fremtidsperspektiver

Visioner og fremtidsperspektiver for uddannelsen, herunder opfølgningsplan, jf. bilag 3

Digitalisering

Vi foreslår at oprette en 3. specialisering som fokuserer på at give et større overblik over processer i landskabet og digitaliseringskompetencer. Et af hovedelementerne i den nye specialisering vil være at give de studerende indsigt og kompetencer i at kunne anvende modeller i forbindelse med vurdering af miljøet og have kompetencer til at man håndtere store datasæt. (Se Bilag 5). Specialiseringen bygger på allerede eksisterende kurser på SCIENCE og har miljø-modellering som et central omdrejningspunkt, da vi kan se, at forståelse og brug af miljø-modeller er et stigende behov blandt aftagere. Dette vil give flere muligheder for de studerende, der søger optagelse på uddannelsen.

Innovation og entreprenørskab

Der er fokus på viden og nytænkning i forbindelse med kurserne så kandidaterne bliver klædt på til at være nytænkende med hensyn til at komme frem med løsninger. Dimittenderne efterlyser dog at der i uddannelsen indgår flere projekter i samarbejde med industrien og at de vil derigennem få en større indsigt i innovativ tanke gang som vil muliggøre entreprenante kandidater.

Eksterne eksperters anbefalinger

De eksterne eksperter kom med en række anbefalinger. Det fremgår af bilag 6, hvilke konkrete anbefalinger, som de eksterne eksperter kom med og hvorvidt studielederen har inkluderet disse i opfølgningsplanen for uddannelsen samt argumenter herfor

Eksterne eksperter

Inddragelse af eksterne eksperter
Eksterne eksperter har været inddraget i uddannelsesevalueringen ved heldagsmøde d. 7. maj 2018, hvor uddannelsen blev evalueret sammen med følgende øvrige uddannelser: • Kandidatuddannelsen i Nature Management • Kandidatuddannelsen i Climate Change • Kandidatuddannelsen i Forest and Nature Management De eksterne eksperter mødtes med fakultets-, studie- og institutledelse, undervisere og studerende for at kvalitetssikre og udvikle uddannelsernes mål, indhold og tilrettelæggelse gennem drøftelse af nye ideer og perspektiver i forhold til uddannelsen. Panelet af eksterne eksperter udgjordes af følgende personer med forskellige fagligheder: • Professor emeritus Jesper Brandt, Roskilde Universitet (kernefaglig ekspert) • Professor Pelle Gemmel, Sveriges lantbruksuniversitet (kernefaglig ekspert) • Research Assistant Lars Christiansen, UNEP Risø Centre (kernefaglig ekspert) • Professor Martin Holmstrup, Aarhus Universitet (kernefaglig ekspert) • Cand. scient., Ph.d Louise Grøndahl, Miljøstyrelsen (aftager) • Chefkonsulent Kristine Kjørup Rasmussen, Rambøll (aftager) • Professor Lars Ulriksen, Københavns Universitet (intern ekspert) • Aslak Heuser Clemen Christiansen, SCIENCE (uddannelsesekstern) Det var panelets vurdering, at uddannelserne i høj grad er forskningsbaserede og at der lader til at være en god balance mellem forskning og undervisning, samt at de studerende opfordres til og understøttes i af lave eksperimentelle eller feltbaserede specialer.

Bilag

Bilag 1a: Kompetencematrix – kandidatuddannelsen i Environmental Science – Specialisation in Chemistry, Toxicology and Health

Den generiske kompetenceprofil fremgår som markeret med blå. Kompetenceprofil specifikt for specialiseringen fremgår som ikke-markeret.

Kvalifikationsramme	**Kompetenceprofil**	**De konstituerede studieaktiviteternes målbeskrivelser**								
		Toxicology and Ecotoxicology	Soil and Water Pollution, Concepts and Theory	Soil and Water Pollution, Experimental Assessment	Air Pollution and Health	Environmental Epidemiology	Environmental and Human Health Risk Assessment of Chemicals	Pesticide Use, Mode of Action and Ecotoxicology	Analytical Chemistry	Speciale
Viden										
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	x				x		x		
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		x	x	x			x		
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.						x			
	International original specialist literature on environmental chemistry, ecotoxicology, human toxicology and environmental epidemiology.	x	x	x	x	x	x	x	x	x
	General knowledge of the effects and the toxicity of pollutants on living organisms.	x				x		x		
	The use of equipment and analysis methods for environmental chemistry, ecotoxicological, human toxicological and environmental epidemiological purposes.	x	x	x	x	x			x	
Forståelses- og refleksionsniveauet: Skal kunne forstå og på et videnskabeligt grundlag reflektere over	How legislative and regulatory measures at the national and international level can be utilised for reducing environmental impact of agricultural and horticultural systems.		x	x			x			
	The classification of chemical substances in relation to their hazard level and define principles for determining threshold values					x	x	x		

fagområdets/ernes viden samt kunne identificere viden-skabelige problemstillinger	for the external environment, working environment, consumer products and food.									
	The analytical methods, experimental approaches and modern biotechnological tools applied at a high scientific level within environmental chemistry, and pollutant effects on ecosystem and health-related issues	x		x				x	x	x
Færdigheder										
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system		x	x	x	x	x			
	Set up mass and energy flows and quantify substance transformations, in particular the transformation of pollutants, using modern models and be able to validate model predictions.	x	x	x	x	x		x		
	Analyse and apply international scientific literature on environmental Science aspects.	x	x	x	x	x	x			x
	Use the most important databases on chemical, microbiological and toxicological substances in relation to pollutants.	x	x	x	x	x	x	x		
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier, metoder, redskaber og generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		x	x	x				x	
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test the hypothesis and communicate the results written as well as orally.	x	x	x	x	x	x		x	x
	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies	x	x	x	x	x	x			x
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.	x	x	x	x	x				
	Participate in the design and performance of scientific experiments.			x						x
	Apply basic scientific principles in connection with the analysis of large data volumes.			x		x			x	
Formidling: Skal kunne formidle forskningsbaseret viden og	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	x	x	x	x	x	x			

diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister										
Kompetencer										
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.						x			
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.						x			
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	x	x				x		x	
	Expand the field of environmental chemistry by developing new technology, by introducing new analysis and monitoring methods as well as by assessing and solving environmental and health problems and potential threats.		x	x	x					
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og tværfagligt samarbejde og påtage sig professionelt ansvar	Handle and solve complex environmental issues in specific work situations or in relation to research.	x	x	x	x	x				
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	x	x	x	x	x	x			x
	Engage in national and international research.	x	x	x	x	x	x			x
	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	x	x	x	x	x	x			x
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.		x	x			x	x		x

Bilag 1b: Kompetencematrix – kandidatuddannelsen i Environmental Science – Specialisation in Soil, Water and Biodiversity

Den generiske kompetenceprofil for Environmental Science
Kompetenceprofil generelt for specialiseringen Soil, Water and Biodiversity
Kompetenceprofil specifikt for profilerne 1. år (1) og 2. år (2) på KU

Profil: Soil Resources and Land Use

Kvalifikationsramme	Kompetenceprofil	De konstituerede studieaktiviteternes målbeskrivelser										
		Environmental Management in Europe (obligatorisk alle profiler)	Speciale	Landscape and Restoration Ecology (centralt BV-kursus alle profiler)	Applied Microbiology (centralt BV-kursus alle profiler)	Land Use, Element Balances and Environmental Impact (1)	Applied Agrohydrology (1)	Analytical Chemistry (1)	Pesticide Use, Mode of Action and Ecotoxicology (1)	Restoration of European Ecosystems and Freshwaters (1)	Soil and Water Pollution – Concepts and Theory (2)	Soil and Water Pollution – Experimental Assessment (2)
Viden												
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	X		X		X				X	X	X
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		X		X	X	X	X	X		X	X
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.	X		X								
	Environmental concepts, problems and relationships in a European and global context.	X	X							X	X	X
	Strategies for handling and solving environmental problems and challenges in a European and a global context.	X	X									
	The systemic and quantitative linkages between natural resource use and water quality.	X										
	The systematic and quantitative linkage between land use and environmental quality, with main focus on water resources.	X								X		

	Soil constituents and the characteristics of common soil types.		X		X	X	X				X	X
	Interactions between inorganic and organic components and the importance of soil organisms to soil functioning.		X		X	X	X		X		X	X
	Technologies to remediate damaged and polluted soils.				X	X				X	X	X
Forståelses- og refleksionsniveauet: Skal kunne forstå og på et videnskabeligt grundlag reflektere over fagområdets/ernes viden samt kunne identificere videnskabelige problemstillinger	How legislative and regulatory measures at the national and international level can be utilised for reducing environmental impact of agricultural and horticultural systems.	X		X		X			X	X		
	The implications of sustainability concepts, and to demonstrate insight in the environmental and land use history of Europe and the lessons learned from that.	X	X	X						X		
	Consequences of land use on soil quality and the environment.		X		X	X	X		X		X	X
Færdigheder												
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system.	X		X		X				X	X	X
	Formulate the kinetics, equilibrium and mass balances for chemical, physical and biological processes affecting matter circulation in ecosystems within the selected area of specialization for each student.	X		X	X	X		X	X			
	Analyse interactions between soil components and inorganic and organic compounds in soil solution in relation to land use and the environment.				X	X	X	X			X	X
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier, metoder, redskaber og	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		X			X		X			X	X
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test the hypothesis and communicate the results written as well as orally.		X			X						X

generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies		X			X						X
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.		X			X	X		X		X	
	Understand and apply the methods and techniques used for environmental monitoring, and subsequent handling, statistical analysis and presentation of environmental data.	X	X			X						
	Apply and master up-to-date methodologies (molecular, analytical, modelling) for research on plant and/or environmental processes.		X				X	X	X			X
	Apply theory based and practical tools to analyse soils in the environment such as data collection, ecotoxicology, environmental modelling, life cycle analysis, environmental load, sustainable crop production.		X		X		X	X	X	X	X	X
Formidling: Skal kunne formidle forskningsbaseret viden og diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	X	X							X		
Kompetencer												
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.	X	X	X		X			X	X	X	
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.	X	X	X		X				X		
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	X		X		X			X		X	

	Transfer research results on environmental processes and impacts into proposals for improving sustainability of agricultural and horticultural systems.		X			X				X		X
	Demonstrate capacity for independent work and creativity in the application of knowledge and skills in soil work situations or in research.		X									X
	Participate in public discussions of soil resources, land use and soil quality both in international and national perspective.	X	X				X		X		X	X
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og tværfagligt samarbejde og påtage sig professionelt ansvar	Handle and solve complex environmental issues in specific work situations or in relation to research.		X			X	X	X	X		X	X
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	X	X	X	X	X	X	X	X	X	X	X
	Engage in national and international research.	X	X	X	X	X	X	X	X	X	X	X
	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	X	X	X		X				X		
	Effectively communicate and collaborate with others across distances, cultural and language borders, by use of different media such as written texts, oral presentations, video conferences and web-forums.	X		X	X	X	X	X	X	X	X	X
	Cooperate and work independently to create ideas and strategies for reducing soil pollution, soil resource damaging and preserving soil quality in a European context.	X	X		X	X	X		X	X	X	X
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.	X	X	X	X	X	X	X	X	X	X	X

Profil: Environmental Impact

Kvalifikationsramme	Kompetence-profil	De konstituerede studieaktiviteternes målbeskrivelser									
		Environmental Management in Europe	Speciale	Landscape and Restoration Ecology (centralt BV-kursus alle profiler)	Applied Microbiology (centralt BV-kursus alle profiler)	Land Use, Element Balances and Environmental Impact (1)	Life Cycle Assessment within Biological Production Systems (1)	Environmental Impact Assessment (1)	Restoration of European Ecosystems and Freshwaters (1)	Plants in Populations, Communities and Ecosystems (2)	Pesticide Use, Mode of Action and Ecotoxicology (2)
Viden											
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	X		X		X		X	X	X	
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		X		X	X					X
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.	X		X			X	X			
	Environmental concepts, problems and relationships in a European and global context.	X	X				X	X	X		
	Strategies for handling and solving environmental problems and challenges in a European and a global context.	X	X				X	X			
	The systemic and quantitative linkages between natural resource use and water quality.	X						X			
	The systematic and quantitative linkage between land use and environmental quality, with main focus on water resources.	X							X		
	Ecosystem functioning and disturbance.		X							X	
	Structure and functioning of landscapes.									X	
	Theoretical and analytical methods used to assess environmental impacts.		X			X	X				
	Important technologies to reduce and remediate environmental impacts.		X			X	X				

Forståelses- og refleksionsniveauet: Skal kunne forstå og på et videnskabeligt grundlag reflektere over fagområdets/ernes viden samt kunne identificere videnskabelige problemstillinger	How legislative and regulatory measures at the national and international level can be utilised for reducing environmental impact of agricultural and horticultural systems.	X		X		X	X	X	X		X
	The implications of sustainability concepts, and to demonstrate insight in the environmental and land use history of Europe and the lessons learned from that.	X	X	X					X		
	The consequences of human actions on the environment.		X			X	X			X	
Færdigheder											
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system.	X		X		X			X	X	
	Formulate the kinetics, equilibrium and mass balances for chemical, physical and biological processes affecting matter circulation in ecosystems within the selected area of specialization for each student.	X		X	X						X
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier, metoder, redskaber og generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		X			X	X	X	X		
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test the hypothesis and communicate the results written as well as orally.		X			X	X	X			
	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies		X			X		X		X	
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.		X			X	X	X			X

	Understand and apply the methods and techniques used for environmental monitoring, and subsequent handling, statistical analysis and presentation of environmental data.	X	X			X				X	
	Apply theory based and practical tools to analyse environmental impacts such as data collection/evaluation, ecotoxicological methods, environmental modeling.		X			X	X	X	X		X
Formidling: Skal kunne formidle forskningsbaseret viden og diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	X	X				X	X		X	
	Communicate knowledge about environmental impacts by means of standard and advanced communication techniques tailored for the respective user.	X	X			X	X	X	X	X	X
Kompetencer											
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.	X	X	X		X		X	X	X	X
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.	X	X	X		X		X	X		
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	X		X		X	X	X		X	X
	Transfer research results on environmental processes and impacts into proposals for improving sustainability of agricultural and horticultural systems.		X			X	X	X	X		
	Carry out research projects using theoretical and analytical methods to assess environmental impacts.						X	X		X	
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og	Handle and solve complex environmental issues in specific work situations or in relation to research.		X			X					X
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	X	X	X	X	X	X	X	X	X	X
	Engage in national and international research.	X	X	X	X	X	X	X	X	X	X

tværfagligt samarbejde og påtage sig professionelt ansvar	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	X	X	X		X		X	X	X	
	Effectively communicate and collaborate with others across distances, cultural and language borders, by use of different media such as written texts, oral presentations, video conferences and web-forums.	X		X	X	X	X	X	X	X	X
	Cooperate and work independently to create ideas and strategies for remediating and reducing environmental pollution, resource depletion and environmental change.	X	X		X		X	X		X	
	Work in a European context - Support both public and private authorities dealing with environmental impacts.						X	X		X	
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.	X	X	X	X	X	X	X	X	X	X

Profil: Environmental Management

Kvalifikationsramme	Kompetenceprofil	De konstituerede studieaktiviteternes målbeskrivelser										
		Environmental Management in Europe	Speciale	Landscape and Restoration Ecology (centralt BV-kursus alle profiler)	Applied Microbiology (centralt BV-kursus alle profiler)	Motivation and Pro-Environmental Behaviour - Managing Change (1)	Global Environmental Governance (1)	Life Cycle Assessment within Biological Production Systems (1)	Environmental Impact Assessment (1)	Restoration of European Ecosystems and Freshwaters (1)	Political Ecology (2)	Rural Landscapes: Methods and Approaches in Policy Making (2)
Viden												
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	X		X		X	X		X	X	X	X
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		X		X							
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.	X		X		X	X	X	X		X	X
	Environmental concepts, problems and relationships in a European and global context.	X	X				X	X	X	X	X	X
	Strategies for handling and solving environmental problems and challenges in a European and a global context.	X	X			X	X	X	X		X	
	The systemic and quantitative linkages between natural resource use and water quality.	X					X		X		X	
	The systematic and quantitative linkage between land use and environmental quality, with main focus on water resources.	X								X		
	Effects of human actions and intervention on the environment.					X				X		X
	Theoretical and analytical methods within environmental management.					X	X			X		X
Forståelses- og refleksionsniveauet:	How legislative and regulatory measures at the national and international level can be utilised for	X		X		X	X	X	X	X	X	X

Skal kunne forstå og på et videnskabeligt grundlag reflektere over fagområdets/ernes viden samt kunne identificere videnskabelige problemstillinger	reducing environmental impact of agricultural and horticultural systems.											
	The implications of sustainability concepts, and to demonstrate insight in the environmental and land use history of Europe and the lessons learned from that.	X	X	X			X			X	X	X
	Relevant management and policy approaches to cope with the protection and utilisation of natural and environmental goods/resources.	X	X			X	X			X	X	X
Færdigheder												
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system.	X		X			X			X		X
	Formulate the kinetics, equilibrium and mass balances for chemical, physical and biological processes affecting matter circulation in ecosystems within the selected area of specialization for each student.	X		X	X							
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier, metoder, redskaber og generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		X				X	X	X	X		
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test the hypothesis and communicate the results written as well as orally.		X			X	X	X	X		X	X
	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies		X			X	X		X			X
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.		X			X	X	X	X			
	Understand and apply the methods and techniques used for environmental monitoring, and subsequent handling, statistical analysis and presentation of environmental data.	X	X									

	Apply theory based and practical tools to analyse environmental management issues.		X			X	X	X	X	X		
Formidling: Skal kunne formidle forskningsbaseret viden og diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	X	X					x	x	x		
	Communicate knowledge about environmental management in writing.	X	X			X	X	X	X	X	X	X
Kompetencer												
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.	X	X	X			X		X	X	X	
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.	X	X	X		X	X		X	X	X	X
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	X		X			X	X	X			X
	Transfer research results on environmental processes and impacts into proposals for improving sustainability of agricultural and horticultural systems.		X					X	X	X		X
	Carry out projects using theoretical and analytical methods in environmental management.		X					X	X			
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og tværfagligt samarbejde og påtage sig professionelt ansvar	Handle and solve complex environmental issues in specific work situations or in relation to research.		X			X					X	X
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	X	X	X	X	X	X	X	X	X	X	X
	Engage in national and international research.	X	X	X	X	X	X	X	X	X	X	X
	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	X	X	X		X	X		X	X	X	X
	Effectively communicate and collaborate with others across distances, cultural and language borders, by	X		X	X	X	X	X	X	X	X	X

	use of different media such as written texts, oral presentations, video conferences and web-forums.											
	Cooperate and work independently to create ideas and strategies for more sustainable management decisions.	X	X		X		X	X	X			
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.	X	X	X	X	X	X	X	X	X	X	X

Profil: Climate Change

Kvalifikationsramme	Kompetence-profil	De konstituerede studieaktiviteternes målbeskrivelser										
		Environmental Management in Europe	Speciale	Landscape and Restoration Ecology (centralt BV-kursus alle profiler)	Applied Microbiology (centralt BV-kursus alle profiler)	Climate Change Mechanisms and Tipping Points (1)	Climate Change and Biodiversity (1)	Climate Change and Forestry: Monitoring and Policies (1)	Restoration of European Ecosystems and Freshwaters (1)	Climate Change Impacts, Adaptation and Mitigation (2)	Past Climate and Sea Level – Processes and Proxies (2)	Climate Change and Biogeochemical Cycles (2)
Viden												
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	X		X			X	X	X		X	X
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		X		X	X						X
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.	X		X				X		X		
	Environmental concepts, problems and relationships in a European and global context.	X	X			X	X	X	X		X	X
	Strategies for handling and solving environmental problems and challenges in a European and a global context.	X	X							X		

	The systemic and quantitative linkages between natural resource use and water quality.	X				X				X	X	X
	The systematic and quantitative linkage between land use and environmental quality, with main focus on water resources.	X					X		X	X	X	X
	Driving forces of climate change.					X	X	X		X	X	X
	The tools and models used to observe, monitor and predict climate change.					X				X	X	
Forståelses- og refleksionsniveauet: Skal kunne forstå og på et videnskabeligt grundlag reflektere over fagområdets/ernes viden samt kunne identificere videnskabelige problemstillinger	How legislative and regulatory measures at the national and international level can be utilised for reducing environmental impact of agricultural and horticultural systems.	X		X				X	X	X		
	The implications of sustainability concepts, and to demonstrate insight in the environmental and land use history of Europe and the lessons learned from that.	X	X	X			X	X	X			X
	Impacts of changing climatic conditions on ecosystems and ecosystem services.						X	X		X		
	Feedbacks between ecosystems, ecosystem management and climate change.						X	X		X		X
	Mitigation and adaptation measures in terms of technical, economic and political feasibility.						X			X		
Færdigheder												
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system.	X		X				X	X	X		
	Formulate the kinetics, equilibrium and mass balances for chemical, physical and biological processes affecting matter circulation in ecosystems within the selected area of specialization for each student.	X		X	X							
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier,	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		X					X				X
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test		X				X			X		X

metoder, redskaber og generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	the hypothesis and communicate the results written as well as orally.											
	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies		X				X			X		X
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.		X								X	
	Understand and apply the methods and techniques used for environmental monitoring, and subsequent handling, statistical analysis and presentation of environmental data.	X	X			X	X	X			X	X
	Apply theory based and practical tools to analyse climate change impacts and to evaluate possible mitigation alternatives.					X		X		X		
Formidling: Skal kunne formidle forskningsbaseret viden og diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	X	X			X				X		
	Communicate knowledge about climate change and its impacts as well as mitigation and adaptation strategies by means of standard and advanced communication techniques tailored for the respective user.					X				X		
Kompetencer												
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.	X	X	X		X			X	X		X
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.	X	X	X		X			X	X		
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	X		X		X				X		

	Transfer research results on environmental processes and impacts into proposals for improving sustainability of agricultural and horticultural systems.		X						X			
	Conduct assessment projects using theoretical and analytical methods to analyse climate change, its impacts, mitigation, and adaptation options[1].		X							X	X	
	Study in a European context.					X			X	X		
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og tværfagligt samarbejde og påtage sig professionelt ansvar	Handle and solve complex environmental issues in specific work situations or in relation to research.		X			X	X	X		X		X
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	X	X	X	X	X	X	X	X	X	X	X
	Engage in national and international research.	X	X	X	X	X	X	X	X	X	X	X
	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	X	X	X		X			X	X		
	Effectively communicate and collaborate with others across distances, cultural and language borders, by use of different media such as written texts, oral presentations, video conferences and web-forums.	X		X	X	X	X	X	X	X	X	X
	Cooperate and work independently to create ideas and strategies for mitigation of and adaptation to climate change.	X	X		X	X				X		
	Interact with public authorities, private enterprises and NGOs dealing with climate change.					X				X		
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.	X	X	X	X	X	X	X	X	X	X	X

[1] Kompetencen kan også opnås via kurser udbudt på samarbejdsuniversiteterne

Profil: Ecosystems and Biodiversity

Kvalifikationsramme	Kompetence-profil	De konstituerede studieaktiviteternes målbeskrivelser									
		Environmental Management in Europe	Speciale	Landscape and Restoration Ecology (centralt BV-kursus alle profiler)	Applied Microbiology (centralt BV-kursus alle profiler)	Applied Ecosystem Ecology (1)	Land Use, Element Balances and Environmental Impact (1)	Restoration of European Ecosystems and Freshwaters (1)	Plants in Populations, Communities and Ecosystems (2)	Freshwater Ecology (2)	Macro Ecology and Community Ecology (2)
Viden											
Vidensfeltet: Skal inden for et eller flere fagområder have viden, som på udvalgte områder er baseret på højeste internationale forskning inden for et fagområde	The effect of human activities on ecosystem functions.	X		X		X	X	X	X	X	X
	Compounds and processes in soil, water and air at the molecular/mechanistic and ecosystem level.		X		X	X	X			X	X
	The fundamental principles behind environmental policy/legislation, regulation and management in Europe.	X		X							
	Environmental concepts, problems and relationships in a European and global context.	X	X			X		X	X		X
	Strategies for handling and solving environmental problems and challenges in a European and a global context.	X	X			X			X		X
	The systemic and quantitative linkages between natural resource use and water quality.	X				X				X	
	The systematic and quantitative linkage between land use and environmental quality, with main focus on water resources.	X				X		X		X	
	Ecological processes on organism, population and ecosystem levels and their consequences for biodiversity.			X		X			X	X	X
	Theoretical and analytical methods used in ecology.			X		X			X	X	X
Forståelses- og refleksionsniveauet:	How legislative and regulatory measures at the national and international level can be utilised for reducing	X		X			X	X			

Skal kunne forstå og på et videnskabeligt grundlag reflektere over fagområdets/ernes viden samt kunne identificere videnskabelige problemstillinger	environmental impact of agricultural and horticultural systems.										
	The implications of sustainability concepts, and to demonstrate insight in the environmental and land use history of Europe and the lessons learned from that.	X	X	X				X	X	X	X
	Relevant methods for addressing theoretical and applied ecological questions.	X	X	X		X			X	X	X
Færdigheder											
Typen af færdigheder: Skal mestre fagområdets/ernes videnskabelige metoder og redskaber samt mestre generelle færdigheder, der knytter sig til beskæftigelse inden for fagområdet/erne	Present deep insight in structure and functioning of natural and man-influenced rural ecosystems, environmental and health effects of ecosystem perturbations, and be able to develop environmental technologies and measures for achieving sustainable production system.	X		X		X	X	X	X		
	Formulate the kinetics, equilibrium and mass balances for chemical, physical and biological processes affecting matter circulation in ecosystems within the selected area of specialization for each student.	X		X	X						
Vurdering og beslutning: Skal kunne vurdere og vælge blandt fagområdet/ernes videnskabelige teorier, metoder, redskaber og generelle færdigheder samt på et videnskabeligt grundlag opstille nye analyse- og løsningsmodeller	Select and master appropriate up-to-date quantitative and qualitative methodologies for quantifying environmental load and sustainability of production systems.		X			X	X	X		X	X
	Define a scientific problem, set up corresponding hypotheses, plan and execute experiments to test the hypothesis and communicate the results written as well as orally.		X			X	X		X	X	X
	Analyze scientific literature and assess possibilities and limitations in the application of theories, methods and new technologies		X			X	X		X	X	
	Develop and use mathematical models describing biological, physical and chemical processes for predictive purposes and in relation to planning and management.		X				X			X	
	Understand and apply the methods and techniques used for environmental monitoring, and subsequent handling, statistical analysis and presentation of environmental data.	X	X			X	X		X		X
	Apply theory and practical methods to understand ecological processes and management options of	X	X	X	X		X		X		X

	relevance for conservation of biodiversity and ecosystem structure and function.										
	Interpret ecological studies.	X		X		X	X	X	X	X	X
Formidling: Skal kunne formidle forskningsbaseret viden og diskutere professionelle og videnskabelige problemstillinger med både fagfæller og ikke-specialister	Communicate complex information to a wide range of national as well as international audiences using modern and appropriate information and communication tools.	X	X					X	X	X	X
	Communicate knowledge about ecological systems and environmental issues, both orally and in writing.	X	X	X			X		X	X	X
Kompetencer											
Handlingsrummet: Skal kunne styre arbejds- og udviklingssituationer, der er komplekse, uforudsigelige og forudsætter nye løsningsmodeller	Explore complex relationships between the basic scientific aspects of environmental problems and the economic, social and political obstacles that have to be overcome in order to implement solutions on a national and international scale.	X	X	X		X	X	X	X	X	X
	Take into account the social, political and religious influences in connection with the working-out of solutions to environmental issues.	X	X	X		X	X	X		X	
	Assess the impact of new technology on current values and ethics and take this into account when involved in research, risk and uncertainty assessments or the introduction of new technologies	X		X		X	X		X	X	
	Transfer research results on environmental processes and impacts into proposals for improving sustainability of agricultural and horticultural systems.		X			X	X	X		X	X
	Carry out research projects using theoretical and analytical methods to ecological systems for management of biodiversity and other ecological resources in relation to environmental change and human impacts.		X	X		X	X			X	X
Samarbejde og ansvar: Skal selvstændigt kunne igangsætte og gennemføre fagligt og tværfagligt samarbejde	Handle and solve complex environmental issues in specific work situations or in relation to research.		X			X	X			X	X
	Work independently and efficiently on your own, in teams as well as in interdisciplinary environments.	X	X	X	X	X	X	X	X	X	X
	Engage in national and international research.	X	X	X	X	X	X	X	X	X	X

og påtage sig professionelt ansvar	Take responsibility for research-, adviser- or policy-related activities within agriculture, environment and food systems in real-life situations.	X	X	X		X	X	X	X	X	X
	Effectively communicate and collaborate with others across distances, cultural and language borders, by use of different media such as written texts, oral presentations, video conferences and web-forums.	X		X	X	X	X	X	X	X	X
	Cooperate and work independently to create ideas and strategies for testing ecological questions both in theory and in practice.	X	X		X		X	X	X		X
Læring: Skal selvstændigt kunne tage ansvar for egen faglig udvikling og specialisering	Apply life-long learning as a principle to independently assess and structure learning processes and assume responsibility for continuous academic development. Create ideas and strategies for development of environmental technology in relation to remediation and reduction of pollution from soils and waters.	X	X	X	X	X	X	X	X	X	X

Bilag 2: Forskningsmatrix – kandidatuddannelsen i Environmental Science

Uddannelsens konstituerende studieaktiviteter	**ViP'er (kursusansvarlige og centrale undervisere) på de konstituerende studieaktiviteter**	**ViP'ernes tilknytning til forskningsmiljø** Forskningsmiljøet er givet sammen med link til forskningsgruppernes hjemmesider			
Chemistry, Toxicology and Health					
		Institut	**Sektion**	**Forskningsgruppe**	**Forskning**
Toxicology and Ecotoxicology	Bjarne Styrishave	SUND IF	Analytical Biosciences	Toxicology Lab	Experimental research revealing the occurrence, fate, and toxicological and endocrine effects of xenobiotics, especially pharmaceuticals, with the aim of assessing their risks to humans and biota.
Soil and Water Pollution – Concepts and Theory	Hans Chr. Bruun Hansen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Solid-solution processes in soils and sediments governing pollutant fate and with applications in soil and water cleaning.
	Kristian Koefoed Brandt	PLEN	Mikrobiel Økologi og Bioteknologi	Environmental Microbiology	Diversity and functioning of microbial communities in natural and man-made environments in order to protect and optimize ecosystem services.
Soil and Water Pollution – Experimental Assessment	Hans Chr. Bruun Hansen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Solid-solution processes in soils and sediments governing pollutant fate and with applications in soil and water cleaning.
	Kristian Koefoed Brandt	PLEN	Mikrobiel Økologi og Bioteknologi	Environmental Microbiology	Diversity and functioning of microbial communities in natural and man-made environments in order to protect and optimize ecosystem services.
	Peter Engelund Holm	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology

	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Air Pollution and Health	Ole John Nielsen	CHEM	Fysisk Kemi	CCAR- Copenhagen Chemistry Atmospheric Research	Atmospheric chemistry and hence environmental impact of CFC replacement compounds and of oxygenated species. Fundamental kinetics and mechanisms of reactions important in atmospheric and combustion chemistry. Determination of the environmental impact of anthropogenic and natural emissions - out-door as well as in-door chemistry. Atmospheric particulates. Air pollution chemistry. Climate Change.
	Matthew Johnsson	CHEM	Fysisk Kemi	Atmospheric Infuser Research laboratory	Through research into the GPAO or Gas Phase Advanced Oxidation air cleaning method AIR lab hopes to solve emission problems in industrial and residential settings.
	Peter Møller	SUND IFSV	Miljø og Sundhed	Particles and Oxidative Stress	Toxicological mechanisms of environmental exposures, including effects related to air pollution and particles, dietary factors, physiological processes in relation generation of reactive oxygen species and oxidative stress.
Environmental Epidemiology	Peter Møller	SUND IFSV	Miljø og Sundhed	Particles and Oxidative Stress	Toxicological mechanisms of environmental exposures, including effects related to air pollution and particles, dietary factors, physiological processes in relation generation of reactive oxygen species and oxidative stress.
Environmental and Human Health Risk Assessment of Chemicals	Mads Paludan Goddiksen	IFRO	Forbrug, Bioetik og Regulering		Teaching of philosophy of science, ethics and responsible conduct of research. Contribute to research on interdisciplinary higher education.
Pesticide Use, Mode of Action and Ecotoxicology	Nina Cedergreen	PLEN	Miljøkemi og Fysik	Environmental Toxicology	Effects of chemical pollutants on individual organisms and their physiology and on populations and ecosystems.

	Helle Marcussen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of contaminants, soil remediation, water chemistry and technology
Analytical Chemistry	Jan H. Christensen	PLEN	Miljøkemi og fysik	Analytical Chemistry	Analyzing all compounds present in a matrix to get a better understanding of environmental, industrial and green chemistry processes.
	Jette Petersen	PLEN	Miljøkemi og fysik	Analytical Chemistry	Laboratory technician
	Daniel Persson	PLEN	Plante- og Jordvidenskab	Plant Nutrition	Nutrient transport, compartmentation and speciation
Speciale	Videnskabeligt ansatte fra både SCIENCE og SUND, der er involveret i uddannelsen og deres faglige netværk. Mange specialer har medvejledere udenfor KU.				

Uddannelsens konstituerende studieaktiviteter	**ViP'er (kursusansvarlige og centrale undervisere) på de konstituerende studieaktiviteter**	**ViP'ernes tilknytning til forskningsmiljø**			
Soil, Water and Biodiversity					
	Underviser	**Institut**	**Sektion**	**Forskningsgruppe**	**Forskning**
Environmental management in Europe	Christian Bugge Henriksen	PLEN	Afgrødevidenskab	Climate and Food Security	Improved process and system level understanding of crop biosystems and food systems including food and energy production, global food production, climate and agronomy.
	Alex Dubgård	IFRO	Miljø og Naturressourcer		Environmental cost-benefit and cost-effectiveness analysis, economic valuation and environmental policy instruments.
	Per Gundersen	IGN	Skov, natur & biomasse	Biogeochemistry	Biogeochemical cycling of N, C and water with a main focus on N cycling in forests in particular N retention and nitrate leaching from forest under elevated N deposition (both in temperate and tropical forests).
	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology

	Merete Styczen	PLEN	Miljøkemi og Fysik	Agrohydrology	Soil physics and environmental biophysics including the microclimate of plants
Landscape and Restoration Ecology	Peter Stubkjær Andersen	IGN	Landskabsarkitektur og planlægning	Spatial Change and Planning	Landscape management and planning with special focus on landscape ecology, ecosystem services, landscape multifunctionality, and landscape planning processes.
	Karsten Raulund-Rasmussen	IGN	Forest, Nature and Biomass	Forest Resource Assessment and Bioenergy	Ecosystem Services and Functions
Applied Microbiology	Ole Nybroe	PLEN	Mikrobiel Økologi og Bioteknologi	Microbial Interactions	Microbiome assembly in soil, rhizosphere and hyphosphere, as well as functioning of root- or hyphae-associated bacteria with the potential to promote plant or fungal growth.
	Peter Stougaard	PLEN	Mikrobiel Økologi og Bioteknologi	Microbial Biotechnology	Microbial genetics, molecular biology, biotechnology. Arctic agriculture, biocontrol and antifungal compounds, extremophilic microorganisms, enzymes and application of enzymes, biotechnology.
	Mette H. Nicolaisen	PLEN	Mikrobiel Økologi og Bioteknologi	Microbial Interactions	Environmental factors affecting colonization and persistence of these microorganisms as well as the molecular mechanisms behind microbe-microbe communication.
	Lise Bonnichsen	PLEN	Mikrobiel Økologi og Bioteknologi	Microbial Interactions	Microbiome assembly in soil, rhizosphere and hyphosphere, as well as functioning of root- or hyphae-associated bacteria with the potential to promote plant or fungal growth.
	Niels O. G. Jørgensen	PLEN	Mikrobiel Økologi og Bioteknologi	Environmental Microbiology	Cycling of organic compounds by microbial populations in natural and humane-created ecosystems.
Speciale	Alle VIP				Specialerne er forskningsbaserede, og vejlederne er fra det forskningsmiljø som specialet tager udgangspunkt i. Det afhænger derfor af de VIP, der indgår som hoved- og medvejledere.

Profil: Soil Resources and Land Use					
Land Use, Element Balances and Environmental Impact	Per Gundersen	IGN	Skov, natur & biomasse	Biogeochemistry	Biogeochemical cycling of N, C and water with a main focus on N cycling in forests in particular N retention and nitrate leaching from forest under elevated N deposition (both in temperate and tropical forests).
	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Applied Agrohydrology	Carsten Tilbæk Petersen	PLEN	Miljøkemi og Fysik	Agrohydrology	Soil physics and environmental biophysics including the microclimate of plants. Main focus is Agro-ecosystems.
	Per Abrahamsen	PLEN	Miljøkemi og Fysik	Agrohydrology	Computer Scientist. Scientific programming with special focus on implementation and integration of interacting physical and mathematical models of agro-ecological processes in a single system.
Analytical Chemistry	Jan H. Christensen	PLEN	Miljøkemi og fysik	Analytical Chemistry	Analyzing all compounds present in a matrix to get a better understanding of environmental, industrial and green chemistry processes.
	Jette Petersen	PLEN	Miljøkemi og fysik	Analytical Chemistry	Laboratory technician
	Daniel Persson	PLEN	Plante- og Jordvidenskab	Plant Nutrition	Nutrient transport, compartmentation and speciation
Pesticide Use, Mode of Action and Ecotoxicology	Nina Cedergreen	PLEN	Miljøkemi og Fysik	Environmental Toxicology	Effects of chemical pollutants on individual organisms and their physiology and on populations and ecosystems.
	Helle Marcussen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of contaminants, soil remediation, water chemistry and technology
Restoration of European Ecosystems and Freshwaters	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Soil and Water Pollution – Concepts and Theory	Hans Chr. Bruun Hansen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Solid-solution processes in soils and sediments governing pollutant fate and with applications in soil and water cleaning.

	Kristian Koefoed Brandt	PLEN	Mikrobiel Økologi og Bioteknologi	Environmental Microbiology	Diversity and functioning of microbial communities in natural and man-made environments in order to protect and optimize ecosystem services.
Soil and Water Pollution – Experimental Assessment	Hans Chr. Bruun Hansen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Solid-solution processes in soils and sediments governing pollutant fate and with applications in soil and water cleaning.
	Kristian Koefoed Brandt	PLEN	Mikrobiel Økologi og Bioteknologi	Environmental Microbiology	Diversity and functioning of microbial communities in natural and man-made environments in order to protect and optimize ecosystem services.
	Peter Engelund Holm	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Profil: Environmental Impact					
Land Use, Element Balances and Environmental Impact	Per Gundersen	IGN	Skov, natur & biomasse	Biogeochemistry	Biogeochemical cycling of N, C and water with a main focus on N cycling in forests in particular N retention and nitrate leaching from forest under elevated N deposition (both in temperate and tropical forests).
	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Life Cycle Assessment within Biological Production Systems	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Environmental Impact Assessment	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.

	Ole Mertz	IGN	Geografi	Environment and Society in Developing Countries	Global environmental change, land use transitions and food security in the Global South.
Restoration of European Ecosystems and Freshwaters	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Plants in Populations, Communities and Ecosystems	Thure P Hauser	PLEN	Organismebiologi	Plant Ecology	Evolution of plants defenses against insect herbivores and pathogens. Hybridisation between plant species or ecotypes, and its role in evolution. Inbreeding depression in plants and its influence on evolution of mating system and conservation of small isolated plant populations
	Jacob Weiner	PLEN	Organismebiologi	Plant Ecology	Research within basic and applied plant ecology. Application of ecological knowledge to plant production systems.
	Lars Pødenphant Kiær	PLEN	Organismebiologi	Plant Ecology	Research within basic and applied plant ecology. Application of ecological knowledge to plant production systems.
Pesticide Use, Mode of Action and Ecotoxicology	Nina Cedergreen	PLEN	Miljøkemi og Fysik	Environmental Toxicology	effects of chemical pollutants on individual organisms and their physiology and on populations and ecosystems.
	Helle Marcussen	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of contaminants, soil remediation, water chemistry and technology
Profil: Environmental Management					
Motivation and Pro-Environmental Behaviour - Managing Change	Lise Byskov Herslund	IGN	Landskabsarkitektur og planlægning	Spatial Change and Planning	Urban and regional development in Denmark , Europe and developing countries. Work from an everyday life perspective where the focus is on people's daily lives and living conditions.

Global Environmental Governance	Iben Nathan	IFRO	Global Udvikling		Forest politics and forest governance in the Global South with a particular focus on decentralization and participation
Life Cycle Assessment within Biological Production Systems	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Environmental Impact Assessment	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Restoration of European Ecosystems and Freshwaters	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Political Ecology	Christian Pilegaard Hansen	IFRO	Global Udvikling		The political ecology/political economy of natural resources in developing countries, i.e. the relationships between economic and political processes and the natural resources.
	Jens Friis Lund	IFRO	Global Udvikling		Popular participation in management of forests and other natural resources in developing countries focusing on: decentralized taxation of forest products; local knowledge in forest management; the division of and struggle for power over forest resources among actors ranging from State to rural dwellers and; the impacts of popular participation on forest conservation, rural livelihoods and local enfranchisement.
	Christian Lund	IFRO	Global Udvikling		Property, local politics and state formation; in particular socio-legal processes of conflict over land and natural resources.
	Helle Overgaard Larsen	IFRO	Global Udvikling		Livelihoods and poverty reduction. Looking intotopics such as environmental incomes, decentralised forest management and conservation of natural resources such as medicinal plants and forests

	Mattias Borg Rasmussen	IFRO	Global Udvikling		Rural livelihoods, identity politics and resource struggles from a qualitative, ethnographic perspective. In my research I focus on the intersections between local territorial control, externally driven demands on resources and community – cum-household conflict and cooperation.
Rural Landscapes: Methods and Approaches in Policy Making	Andreas Aagaard Christensen	IGN	Landskabsarkitektur og planlægning	Spatial Change and Planning	Landscape ecology - an interdisciplinary field of research and practice that deals with the mutual association between the spatial configuration and ecological functioning of landscapes, exploring and describing processes involved in the differentiation of spaces within landscapes, and the ecological significance of the patterns which are generated by such processes.
Profil: Climate Change					
Climate Change Mechanisms and Tipping Points	Anders Svensson	NBI	Geofysik	Ice and climate	Ice core stratigraphy, impurity records, chronologies, and linking to other archives.
Climate Change and Biodiversity	David Bravo Nogues	SNM	Biodiversitet		Fundamental evolutionary and ecological principles and processes that generate and maintain patterns of biodiversity
	Bo Dalsgaard	SNM			Community ecology, ecological networks, island biogeography, macroecology and conservation
Climate Change and Forestry: Monitoring and Policies	Carsten Smith-Hall	IFRO	Global Udvikling		Forest - livelihood relationships, including the role of forests in preventing and reducing poverty Forests and human health, in particular the role of forests in maintaining and improving welfare in developing countries through the provision of traditional medicines Commercial utilisation of Himalayan biodiversity, with emphasis on trade and conservation of medicinal plants.

	Niels Strange	IFRO	Miljø og Naturressourcer		Environmental economics and planning, environmental behaviour, and economics under uncertainty. In particular on climate change and environmental effects. Also involved in a number of research projects concerning payments for environmental services, landowner behaviour and contract design, multi-criteria analysis, environmental economics, spatial planning under risk of calamities, and agent-based modelling.
Restoration of European Ecosystems and Freshwaters	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Climate Change Impacts, Adaptation and Mitigation	Christian Bugge Henriksen	PLEN	Afgrødevidenskab	Climate and Food Security	Improved process and system level understanding of crop biosystems and food systems including food and energy production, global food production, climate and agronomy.
	Inez Harker-Schuch	PLEN	Afgrødevidenskab		Undervisningsassistent
	Marin Lysák	PLEN	Afgrødevidenskab		Ph.d-studerende
	Peter Furu	SUND IFSV	Global Sundhed		Environmental health. Health impact assessment (HIA). Health related aspects of agricultural development and water resources development. Health impacts of climate change. Integrated schistosomiasis control.
	Thomas Blunier	NBI	Geofysik	Ice and climate	Reconstruction of climate records from ice cores. Evolution of concentration and isotope ratios of greenhouse gases. Internal variability of the climate system especially between hemispheres
	Anita Rønne	JUR	Offentlig Regulering og Administration		Energy law
	Marina Bergen Jensen	IGN	Landskabsarkitektur og planlægning	Landscape Technology	Invent and document nature-based solutions for climate adaptation, environmental protection, and biodiversity support of cities.

	Jens Friis Lund	IFRO	Global Udvikling		Popular participation in management of forests and other natural resources in developing countries focusing on: decentralized taxation of forest products; local knowledge in forest management; the division of and struggle for power over forest resources among actors ranging from State to rural dwellers and; the impacts of popular participation on forest conservation, rural livelihoods and local enfranchisement.
	Ole John Nielsen	CHEM	Fysisk Kemi	CCAR-Copenhagen Chemistry Atmospheric Research	Atmospheric chemistry and hence environmental impact of CFC replacement compounds and of oxygenated species. Fundamental kinetics and mechanisms of reactions important in atmospheric and combustion chemistry. Determination of the environmental impact of anthropogenic and natural emissions - out-door as well as in-door chemistry. Atmospheric particulates. Air pollution chemistry. Climate Change.
Past Climate and Sea Level – Processes and Proxies	Christoph Korte	IGN	Geologi	Sedimentary Systems	Earth's sedimentary record to reconstruct ancient environments and processes, Earth geo- and biological evolution and climate history, and sedimentary basins
Climate Change and Biogeochemical Cycles	Riikka Rinnan	BIO	Terristrisk Økologi	Ecosystem-Atmosphere Interactions	Controls of the emission of biogenic volatile organic compounds (BVOC), especially in the Arctic.
Profil: Ecosystems and Biodiversity					

Applied Ecosystem Ecology	Klaus Steenberg Larsen	IGN	Skov, natur & biomasse	Biogeochemistry	Carbon and Nitrogen cycling in terrestrial ecosystems in a climate perspective. Greenhouse gas exchange between ecosystems and the atmosphere. Improved understanding and modelling of photosynthesis and respiration at the ecosystem level. Interaction between carbon and nitrogen cycling at local and global scales. Interactions between climate drivers and their role for net ecosystem climate change feedback.
	Inger Kappel Schmidt	IGN	Skov, natur & biomasse	Ecology and Nature Management	Forest and heathland ecology with emphasis on ecosystem processes and function and whole ecosystem ecology.
	Søren Christensen	BIO	Terrestrisk Økologi	Carbon Turnover Dynamics	Microorganism-microfauna interaction; as the motor in the decomposition process, and as a mechanism affecting microbial diversity.
	Helge Ro-Poulsen	BIO	Terrestrisk Økologi	Ecophysiology and Environmental Management	Plant ecophysiology, especially related to danish and arctic heathland vegetation. Air pollution and Global Change effects on plants: Ozone, UV-B, CO2, temperature, drought. Gas fluxes between canopies and the atmosphere.
	Bent Vismann	BIO	Marinbiologi		Research in marine invertebrate physiology with focus on 1) the effect of low oxygen on the energy metabolism, 2) filter feeding bivalves including toxic algae and energetics and 3) aquaculture.
	Dean Jacobsen	BIO	Ferskvandsbiologi		Basic and applied stream ecology, focusing on function, spatial distribution and temporal variability in diversity and composition of benthic macroinvertebrate communities and eco-physiological performance along environmental and geographical gradients in e.g. altitude, temperature and oxygen.

Land Use, Element Balances and Environmental Impact	Per Gundersen	IGN	Skov, natur & biomasse	Biogeochemistry	Biogeochemical cycling of N, C and water with a main focus on N cycling in forests in particular N retention and nitrate leaching from forest under elevated N deposition (both in temperate and tropical forests).
	Sander Bruun	PLEN	Plante- og Jordvidenskab	Soil Fertility	Organic matter in soil and degradability of organic matter.
Restoration of European Ecosystems and Freshwaters	Bjarne W. Strobel	PLEN	Miljøkemi og Fysik	Environmental Chemistry	Fate of Contaminants Soil Remediation Water chemistry and technology
Plants in Populations, Communities and Ecosystems	Thure P Hauser	PLEN	Organismebiologi	Plant Ecology	Evolution of plants defenses against insect herbivores and pathogens. Hybridisation between plant species or ecotypes, and its role in evolution. Inbreeding depression in plants and its influence on evolution of mating system and conservation of small isolated plant populations
	Jacob Weiner	PLEN	Organismebiologi	Plant Ecology	Research within basic and applied plant ecology. Application of ecological knowledge to plant production systems.
	Lars Pødenphant Kiær	PLEN	Organismebiologi	Plant Ecology	Research within basic and applied plant ecology. Application of ecological knowledge to plant production systems.
Freshwater Ecology	Ole Pedersen	BIO	Ferskvandsbiologi		Flooding tolerance in crops and natural wetland plants. Internal aeration during submergence Underwater photosynthesis and respiration Ecophysiology of isoetids (Lobelia, Littorella and Isoetes). Brownification of softwater lakes Seagrass ecology. Plant-sediment interactions Gas and water transport in aquatic plants.
	Kirsten Christoffersen	BIO	Ferskvandsbiologi		Aquatic ecology, food webs, carbon flow, climate

	Dean Jacobsen	BIO	Ferskvandsbiologi		Basic and applied stream ecology, focusing on function, spatial distribution and temporal variability in diversity and composition of benthic macroinvertebrate communities and eco-physiological performance along environmental and geographical gradients in e.g. altitude, temperature and oxygen.
	Theis Kragh	BIO	Ferskvandsbiologi		Disssolved organic matter (DOM) in aquatic ecosystems: the effect of biological and photo-chemical processes on DOM dynamics.
Macro Ecology and Community Ecology	Hans Henrik Bruun	BIO	Økologi og Evolution		Ecology and biodiversity, with special focus on community assembly, with a preference for plants and their associated biota of insects and fungi, and on evidence-based nature conservation.
	Michael Krabbe Borregaard	SNM	Biodiversitet		The role of range distributions in generating macro ecological patterns

Bilag 3: Opfølgningsplan – kandidatuddannelsen i Environmental Science

År	**Problemstilling og mål** Hvad er problemet? Hvad er målet?	**Handlinger** Hvad skal sættes i gang, for at nå målet eller for at analysere problemstillingen? Forventet ressourceforbrug	**Resultater** Hvad indikerer, at målet er opnået?	**Tidsplan** Hvornår skal målet være opnået? Hvilke milepæle er der undervejs?	**Ansvar** Hvem har ansvaret for at gennemføre indsatserne? Hvem følger op på tidsplan og resultater?
2018	Med de to specialiseringer der er i Environmental science vil det komplementere uddannelsen, at der kommer en specialisering med fokus på modellering og en mere overordnet forståelse af miljøudfordringer.	Drøfte specialisering med det faglige miljø – det faglige indhold, progression og karrieveje.	Ny specialisering beskrevet i studieordningen.	Indsendt september 2018	SL/VILU SN
2018	Styrkelse af karriereparathed som efterspurgt i dimittendanalyse.	Drøfte med relevante aftagere hvordan de kan inddrages mere og give input til projekter/cases til undervisningen.	Tiltag inkorporeres synligt i kursusplaner for det pågældende kursus.	Kursus-beskrivelserne 2019	SL/KA
2018	Digitalisering	Modellering som et obligatorisk element på ChemTox linien og en vigtig valg-mulighed på EnvEuro er introduceret i revisionen af kurset ”Toxicology and Ecotoxicology”, som per 2018 overgår fra FARMA til PLEN. Der lægges vægt på forståelse af de matematiske ligninger, der beskriver sorptions mekanismer, enzym-kinetik, vækstkurver, toksikokinetik, dosis-respons forløb etc. vha. simple modelleringsøvelser	Opdaterede kursusbeskrivelser og digitalisering inddraget i undervisning.	Indsendt november 2018	KA/SL/VILU

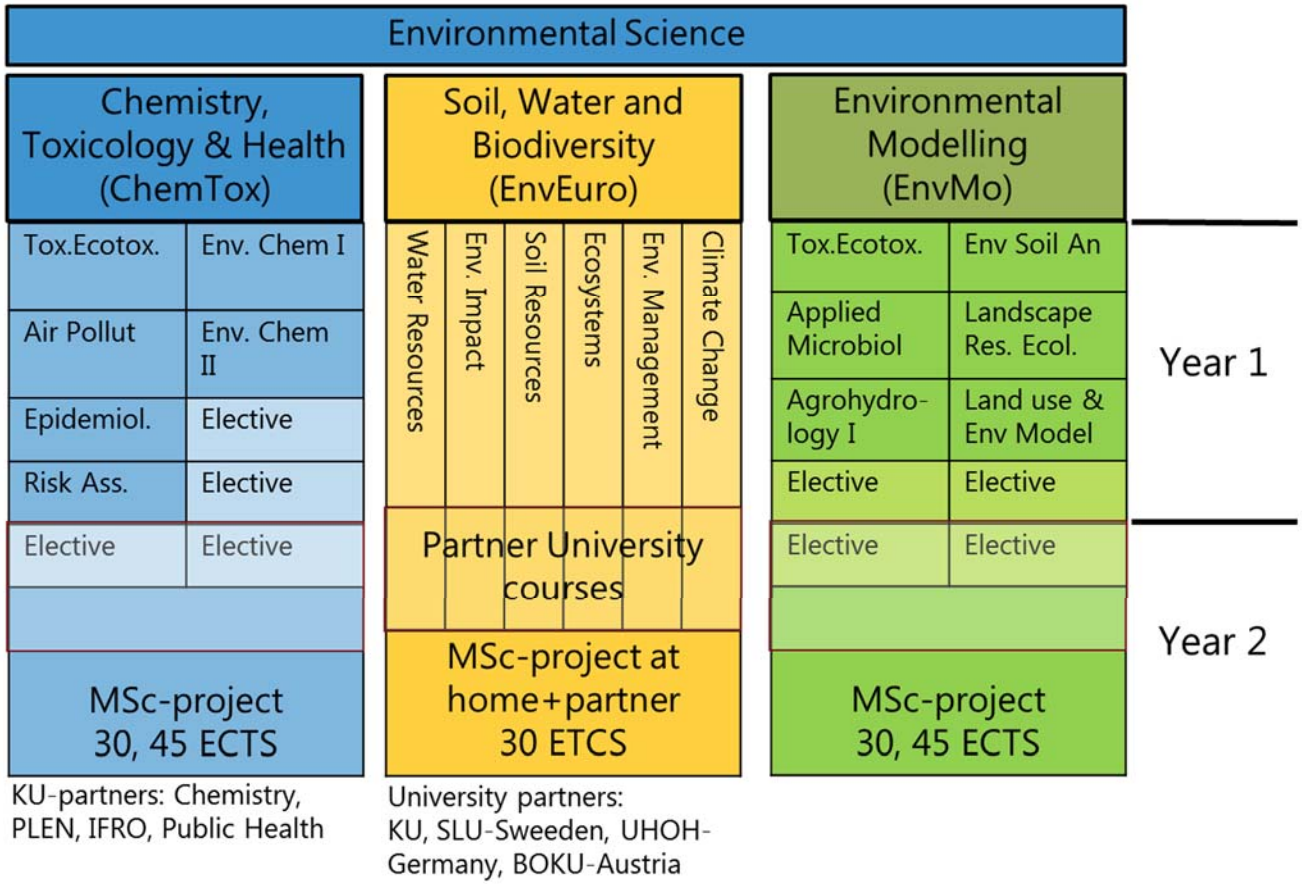
		i Excel. Derudover introduceres brugen af R til modellering af non-lineære kurver og egne laboratoriedata. Der lægges vægt på, at de studerende bruger R nok til at "føle sig hjemme" i modellering af non-lineære regressioner og i brug af et kommando-baseret program, frem for at introducere yderligere programmer f.eks. til brug af dynamisk modellering. Disse vil kunne blive illustreret ved eksempler. På kurset, der kører parallelt i blok 1 "Soil and Water Pollution I" bliver forskellige QSAR modeller og programmet MINTEQ introduceret og regneøvelser og procesforståelse udgør en stor del af kurset. En decideret modelleringsspecialisering med fokus på modellering indføres, så den starter op i 2019, og vil efterfølgende bliver udviklet videre. Kurser herfra kan tages af ChemTox studerende, der ønsker at gå mere i dybden med modelforståelse. Digitalisering – er et væsentlig element i uddannelserne og de studerende får kompetencer indenfor dette.			
2019	Udvikle uddannelsen til at dække nye områder der giver kandidater kompetencer til at adressere udfordringer i fremtiden.	Udvikle miljø-bioteknologi. Drøftes i fagmiljø og finder om udvikles og hvor der er muligheder.	Indarbejdet i studieordning og kurser.	Kursus-beskrivelser 2020	SL/VILU og fagmiljø

Bilag 4: Særlige opmærksomhedspunkter – kandidatuddannelsen i Environmental Science

Mobilitet på uddannelsen *Kommentér på mobiliteten på uddannelsen*
Mobiliteten var ikke så stor (1-2 udrejsende per år) inden EnvEuro blev en del af uddannelsen. Dette skyldes til dels den store mængde studerende, der allerede er flyttet for at tage uddannelsen i København. De har derfor ikke behov for at tage kurser i udlandet. En del tager dog til udlandet i forbindelse med det praktiske specialearbejde. Efter EnvEuro er blevet en del af uddannelsen er udrejseandelen steget kraftigt som følge af det obligatoriske 2. år på et af partneruniversiteterne.
Undervisningsevaluering *Kommentér på resultater af evalueringen af minimum alle obligatoriske kurser, der indgår i studieordningen, for det studieår, som evalueringen vedrører.*
Afrapporteret internt på SCIENCE.

Bilag 5: Forslag til ny specialisering

Suggestion for a third specialisation for Environmental Science



Specialisation: Environmental Science and modelling

Course number	**Mandatory course**		
• NPLB14022U	Experimental Soil Analysis	Block 1A	7.5 ECTS
• Nyt	Toxicology and Ecotoxicology	Block 1B	7.5 ECTS

• LBIK10180U	Applied Microbiology	Block 2A	7.5 ECTS
• NIGK14052U	Landscape and Restoration Ecology	Block 2B	7.5 ECTS
• NIGK17000U	Land Use and Environmental Modelling	Block 3A	7.5 ECTS
• NPLK14023U	Applied Agrohydrology I	Block 3B	7.5 ECTS
	Restricted elective courses		
• NPLK14009U	Plants in Populations, Communities and Ecosystems	Block 1C	7.5 ECTS
• PhD/MSc	Applied Agrohydrology II	Block 1?	7.5 ECTS
• NPLK14029U	Soil and Water Pollution – Experimental Assessment	Block 2C	7.5 ECTS
• NIGK15027U	Surface Hydrology	Block 3C	7.5 ECTS
• LTEK10157U	Natural Resource Sampling and Modelling	Block 3B	7.5 ECTS
• NIGK14002U	Geographical Information Systems (GIS)	Block 3C	7.5 ECTS
• NPLK14004U	Life Cycle Assessment within Biological Production Systems	Block 4A	7.5 ECTS
• LNAK10010U	Environmental Impact Assessment	Block 4C	7.5 ECTS
• NIGK13019U	Water Resources Management	Block 4A	7.5 ECTS
• LNAK10095U	Restoration of European Ecosystems and Freshwaters	Block 5	7.5 ECTS
• NGEB12003U	Grundlæggende geografiske informations systemer & kartografi -*Danish*	Block 5	7.5 ECTS

Environmental Science at University of Copenhagen

Do you want to get an European view on Environmental issues?
Choose our double degree specialisation **EnvEuro**

Do you want to understand and model environmental system processes on a landscape scale? Choose our **EnvMo** specialisation

Do you want to understand the fate and effects of pollutants on environmental and human health? Choose our **ChemTox** specialisation

Bilag 6. Status på opfølgning på eksterne eksperters anbefalinger – Kandidatuddannelsen i Environmental Science

	Eksterne eksperters anbefaling	Inkl. i opfølgnings-plan (ja/nej)	Hvis nej, argumentér herfor
1	**Tydeliggørelse/profilering af uddannelsen over for potentielle aftagere (*alle uddannelser*)** Øget koordination mellem uddannelserne For at undgå uhensigtsmæssige faglige overlap og for at aftagere nemmere kan gennemskue, hvordan uddannelserne adskiller sig fra hinanden.	Ja	Det er en del af det handlingspunkt hvor der bliver fokuseret på karriere og inddragelse af aftagere i undervisningen. Der er flere af kurserne der henvender sig til studerendende fra flere uddannelser, så der samarbejdes med andre fagligheder – og forståelse af andre fagligheder. Dette er et vigtigt element når kandidaterne kommer ud i job. Environmental Science adskiller sig en del fra de andre uddannelser i denne pulje da den er og baserer sig meget mere på naturvidenskab. Langt de fleste af disse kandidater har allerede job før de er færdige – eller lige efter. De er kendt og efterspurgt af aftagerne.
2	**Modellering som et obligatorisk element på ChemTox-linjen**. Modellering som metode kan indføres i højere grad på de eksisterende kurser, så de nuværende studerende på de andre to specialiseringer på ChemTox har mulighed for at blive skarpere på dette felt.	Ja	Modellering som et obligatorisk element på ChemTox linien bliver introduceret i revisionen af kurset ”Toxicology and Ecotoxicology”, som per 2018 overgår fra FARMA til PLEN. Der lægges vægt på forståelse af de matematiske ligninger, der beskriver sorptions mekanismer, enzym-kinetik, vækstkurver, toksikokinetik, dosis-respons forløb etc. vha. simple modelleringsøvelser i Excel. Der ud over introduceres brugen af R til modellering af non-lineære kurver og egne laboratorie-data. Der lægges vægt på, at de studerende bruger R nok til at ”føle sig hjemme” i modellering af non-lineære regressioner og i brug af et kommando-baseret program, frem for at introducere yderligere programmer f.eks. til brug af dynamisk modellering. Disse vil kunne blive illustreret ved eksempler. På kurset, der kører parallelt i blok 1 ”Soil and Water Pollution I” bliver forskellige QSAR modeller

			og programmet MINTEQ introduceret og regneøvelser og proces forståelse udgør en stor del af kurset. En decideret modellerings-specialisering med fokus på modellering indføres så den starter op i 2019, og vil efterfølgende bliver udviklet videre. Kurser herfra kan tages af ChemTox studerende, der ønsker at gå mere i dybden med model-forståelse. Digitalisering – er et væsentlig element i uddannelserne og de studerende får kompetencer indenfor dette.
3	**Mere fleksibilitet – både i forhold til kurser og speciale (*alle uddannelser*)** • Begrænset af at kurser kun udbydes i bestemte blokke og nogle kurser aflyses pga. for få tilmeldte. • Bedre muligheder for udveksling i form af samling af obligatoriske og valgfrie kurser i kassogrammet. • Fleksibilitet i forhold til specialestørrelse – mulighed for både store og små specialer. • E-learning som alternativ til aflysning af kurser ved for få tilmeldte.	Nej	Alle obligatoriske kurser på Environmental Science bliver afholdt. I 2018 er det blevet muligt at vælge mellem 30 og 45 ETCS specialer. Hjemmesiden for Environmental Science indeholder kassogrammer med forslag til relevante valgfrie og begrænset valfrie kurser udbudt i de forskellige blokke.