



SUNRAISE: Sustainable Natural Resource Use in Arctic and High Mountainous Areas

Courses reviewed and developed at the CNR RUB Bhutan



With the support from the SUNRAISE project, there has been significant contribution to the development of the college infrastructure particularly equipment, and collaboration. Table 1 indicate the main courses considered for the review and deliver to RUB students. Table 2, to Table 7 indicate the additional modules and programmes developed with the support of the SUNRAISE project.

Table 1. The list of CNR RUB courses eligible for reporting under the Erasmus+ CBHE guidelines:

Sl no	Title of the course, equivalent ECTS (Credit at RUB)	Title of the program (if applicable) and course duration	The institutional level of the accreditation (department, university, national etc)	Revision/New development of the syllabus	Number of students taught	Remarks
1	Natural Resources Management, ECTS 5 equivalent (15 RUB Credits)	MSc Natural Resources Management; 2 years; by research; 5 ECTS	University after College Academic Committee's (CAC) endorsement.	The revised courses is being offered from fall semester 2020	08	https://www.cnr.edu.bt/?page_id=250
2	WRM202: Water Resources Management	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 4 ECTS.	University after CAC endorsement	The revised course is being offered from January Spring semester 2021	40	https://www.cnr.edu.bt/?page_id=237
3	WRM101: Hydrology	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 5 ECTS.	University after CAC endorsement	The revised course is being offered from January Spring semester 2021	40	https://www.cnr.edu.bt/?page_id=237

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4	CLM102: Climate Change Assessment and Mitigation.	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 4 ECTS.	University after CAC endorsement	The revised courses is being offered from January Spring semester 2021.	40	https://www.cnr.edu.bt/?page_id=237
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Table 2. The list of CNR RUB courses developed and accredited under SUNRAISE, yet not eligible to report due to late enrollment

Sl no	Title of the course, equivalent ECTS (Credit at RUB)	Title of the program (if applicable) and course duration	The institutional level of the accreditation (department, university, national etc)	Revision/New development of the syllabus	Number of students to be taught	Remarks
1	NRM302: Community Based Natural Resources Management ECTS 6 equivalent credits (RUB credit 12).	BSc Forest Science; 4 years; RUB credit 12. Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	38	https://www.cnr.edu.bt/?page_id=231
2	EVS101: Introduction to Environmental Studies.	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=237

3	CLM101: Introduction to Meteorology and Climatology.	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=237
4	EVS304 Pollution Abatement and Management	BSc Environment and Climate Studies; 3 years; RUB Credit 12. Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=237
5	CLM410 Climate Smart Agriculture	BSc Agriculture; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	35	https://www.cnr.edu.bt/?page_id=203
6	AGR404 Integrated Farming System	BSc Agriculture; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	35	https://www.cnr.edu.bt/?page_id=203
7	APR407 Sustainable Livestock Farming	BSc Animal Science; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	35	https://www.cnr.edu.bt/?page_id=233
8	EVS101 Environmental Science	BSc Forest Science; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=231



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9	NRM204 Integrated Watershed Management	BSc Forest Science; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=231
10	CLM307 Climate Change, Adaptation and Mitigation	BSc Forest Science; 4 years; RUB credit 12; Equivalent to 6 ECTS.	University after CAC endorsement	The revised courses will be offered from January Spring semester 2022.	40	https://www.cnr.edu.bt/?page_id=231

Note:

A total of 04 courses were identified for review for the purpose of SUNRAISE project however in the process all the courses under the five programs (MSc in Natural Resources Management by Research, BSc in Agriculture, BSc in Animal Science, BSc in Environment and Climate Studies and BSc in Forest Science) were benefitted where in the process of reviewing the four modules all other modules were also facilitated. The four courses were offered 2019 as trial and after review in 2020.

Among the five programs, BSc in Environment and Climate Studies program benefitted most with addition of about seven new modules to the program and detailed review of all the courses. Curriculum map of all the programs which are all reviewed is presented below from Table 2 to Table 10. The SUNRAISE project activities also facilitated the development of two new post graduate program and one PhD program and the curriculum map of which is presented in Table 3, 4, 5 & 6. For the purpose of reporting the activities to SUNRAISE activities, the detailed content of 15 courses reflected in Table 1 is considered.

Table 3: BSc. Environment and Climate Studies Programme Structure (program curriculum)

Yr.	Sem.	Module code and title				
I	I	ACS101 Academic Skills	EVS104 Introduction to Environmental and Climate Science	ECL104 Introduction to Ecology and Ecosystems	EVS110 Environmental Chemistry	NRM101 Water Resource Management
	Bhutanese Society and Culture (SOC102) of 12 credits					
	II	EVS111 Conservation Biology	CLM102 Hydrology	CLM103 Introduction to Meteorology and Climatology	GES102 Geology and Soil Science	SOC103 Environmental Sociology

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II	I	DEN401 Dendrochronology and Wood Anatomy	NRM407 Recreation and Ecotourism	EVS305 Environmental Toxicology	NRM212 Vegetation Dynamics	CLM204 Climate Change
	II	GIS203 Spatial Information Systems for Environmental Studies	HAZ201 Disaster Risk and Management	RES203 Research Methods for Environmental Science	STS301 Statistics	CLM306 Climate Resilient Agriculture
III	I	ECN304 Applied Environmental Economics	CLM305 Climate Change and Mitigation	EVS304 Pollution and Management	EVS309 Strategic Environmental Assessment	EVS 312 Environmental Systems Analysis
	Internship (ATT304) of 12 credits					
	II	EVS308 Green Technology and Development	DZG101 རྫོང་ཁ་བཟང་དོན་ལྗོད་ལེན།	EVS307 Environmental Policies and Law	PWK303 Project Work	

* Orange coloured text indicate the courses (modules) are reviewed based on the stakeholders and tutors feedback.

** Blue coloured text indicate that the courses are newly developed based on the stakeholders' feedback and program committee meeting discussion.

Table 4. New Programs approved and ready for launing and delivery

Sl no	Name of the program	Number of courses; Credit value and duration of the course	Launching year	Remarks
1	MSc in Conservation Biology**	3 courses of 15 RUB credits each (equivalent to 7.5 ECTS) in addition to research and publication; 2 years	2023	
2	PhD in Climate Studies***	3 courses of 15 RUB credits each (equivalent to 7.5 ECTS) in addition to research and publication; 2 years	2022	

Table 5. Proposed programme structure (curriculum map for BSc Agriculture).

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Yr.	Sem.	Module Code and Title				
I	I	ACS101 Academic Skills	PLP104 Fundamentals of Entomology	HOR101 Fundamentals of Horticulture	AGR101 Fundamentals of Agronomy	SSC103 Fundamentals of Soil Science
	II	EXT101 Extension and Communication	DZG101 རྗོལ་ཁ་བཅད་དོན་རྫོང་ལེན།	BRS102 Plant Breeding and Seed Production	SSC102 Soil Nutrient Management	AGR102 Farm Mechanization and Irrigation
II	I	ECN201 Farm Economics and Agri-business	HOR202 Horticulture Crop I	EXT202 Community Development	AGR203 Field Crops	PLP205 Fundamentals of Pathology and Nematology
	<i>Field attachment (ATT201) of 12 credits will be conducted from mid Dec to mid-Feb at the end of Yr. II Sem I.</i>					
	II	EDP101 Entrepreneurship Development	HOR204 Horticulture Crop II	HOR205 Postharvest Technology	ELP201 Experiential Learning	
III	I	HOR307 Principle of Landscape Gardening and Commercial Floriculture	CLM309 Agro-meteorology and Environmental Science	CYP201 Plant Physiology	BIC301 Biochemistry	BRS303 Seed Technology
	II	BIC302 Microbiology and Biotechnology	PLP306 Pest and Disease Management	RES304 Research Methods	STS302 Statistics	APR301 Animal Production
IV	I	OAG407 Organic Agriculture	AGR404 Integrated Farming System	HOR308 Medicinal, Aromatics, Spices and Plantation Crops	GIS402 Geographic Information System	CLM410 Climate Smart Agriculture
	II	RES405 Research Project				

Table 6. Programme structure (map of the curriculum structure) for BSc Animal Science

Yr.	Sem	Modules
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1	I	ACS101 Academic Skills	EXT101 Communication and Extension	AAP101 Basic Anatomy & Physiology of Farm Animals	RFM101 Fundamentals of Animal Reproduction	ANU101 Fundamentals of Animal Nutrition
	II	DZG101 Dzongkha Communication	AGB101 Fundamentals of Animal Genetics and Breeding	FFD101 Feed and Fodder Development	APR101 Dairy Production	VMD101 Fundamentals of Veterinary Medicine
2	I	ECN201 Farm Economics and Agribusiness	PWK201 Project Work	VSR201 Veterinary Surgery	VMD202 Preventive Veterinary Medicine	APR201 Pig Production
	Field attachment (ATT201) of 12 credits will be conducted from mid Dec to mid-Feb at the end of Yr. II Sem I.					
	II	APR202 Fish Production	RMF202 Reproductive Management of Farm Animals	APR203 Poultry Production	EDP101 Entrepreneurship Development	VMD203 Clinical Veterinary Medicine
3	I	VPH301 One Health and Food Safety	APR304 Apiculture	FAG301 Farm Animal Growth and Development	APR305 Minor Animal Production-Goat, Sheep & Equine	APR306 Yak Production
	II	STS301 Statistics	RES301 Research Methods	DTY301 Dairy Technology	ANU302 Applied Animal Nutrition	AWF301 Animal Welfare
4	I	MGT402 Project Planning and Management	GIS401 Geographical Information System & Remote Sensing	MST401 Meat Science and Technology	AGB402 Biotechnology in Animal Production	APR407 Sustainable Livestock Farming
	II	RES402 Research Project				

Note: Each module is of 12 Credits except Research Project (RES402) 60 credit hours

Table 7. Programme structure (map of the curriculum structure) for BSc Forestry
Table 9. Proposed program structure (Curriculum map of BSc Forestry program).



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Yr.	Sem.	Module Code and Title				
I	I	DZG101 རྩོམ་ཁ་བཏུ་དོན་སྒྲོལ་ལེན།	ACS101 Academic Skill	BOT101 Forest and Systematic Botany	SVY101 Forest Survey	SIL101 Fundamentals of Silviculture
	II	SOF101 Social Forestry	GES101 Geology and Forest Soil	SIL102 Forest Nursery, Plantation and Silviculture Practices	PRT101 Forest Insect, Pest and Diseases	EVS101 Environmental Science
II	I	EXT101 Extension Communication	NRM201 Sustainable Forest Utilization	PRT202 Forest Law and Policy	PRT203 Forest Protection and Patrolling	NRM202 Forest Mensuration
	ATT201 Field attachment					
	II	CSC201 Wildlife Science	CPY201 Plant Physiology	NRM203 Nature recreation and Ecotourism	NRM204 Integrated Watershed Management	RES201 Basic Research and Scientific Communication
III	I	MGT301 Organizational Management and Leadership	EDP101 Entrepreneurship Development	ECL301 Forest Ecology	NRM305 Agroforestry	NRM306 Community Based NRM
	II	STS301 Statistics	RES302 Research Methods	CLM307** Climate Change, Adaptation and Mitigation	NRM307 Forest Management and Planning	CLM308 Hydrology and Meteorology
IV	I	GIS401 Geographic Information Systems	DEN401 Wood Anatomy and Dendrochronology	CSC402 Applied Conservation Science	NRM408 Natural Resource Economics	ECL402 Wetland and Freshwater Ecology
	II	RES403 Research Project				

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