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Ministry of Education and Sports

Savannakhet University

Faculty od Agriculture and Environment No _____/.....

Savannakhet, Date ____/___/___

Course Syllabus

1 Program

Title of the study programme: Wood Processing Technology

2 Course details

Course name: *Forestry Ecology*

Course code: FOA04FE12212

Number of credits (hours/week): 2(1-2-2)

Course type (tick the appropriate box): ☐ Required, ☒ Elective, ☐ Other, if other please explain:

Prerequisites courses: Non

Semester, in which the course is taught: *tick the appropriate box below*

Year 1		Year 2	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
☐	☒	☐	☐

3 Responsible unit: Faculty of Agriculture and Environment

3.1 Department: Department of Forestry Resources

Names and affiliations of lecturer(s): Mr. *Kongchan Doungmala (SKU)*, Phone: +85620 2257 2257, 57356666. Email: kongdml@gmal.com; Office location: Forest Resources Department, Faculty of Agriculture and Environment, Savannakhet University, Savannakhet Province, Lao PDR.

4 Course description

Forest ecology is a course designed to introduce graduates to generate knowledge and skills through various lessons, practices and field trips. The graduates will be expected to learn deeply important modules/topics related to forest ecology especially focused on tropical rain-forest ecosystems. The practices/exercises and field trips are designed to provide students as much experience as possible by assignments/independent studies and field visits respectively. The practices will also cover as many aspects of the forest ecology as possible in an course of master program.

5 Course objectives

6 The Master course in forest ecology aims to provide opportunities to the graduates wishing to pursue professional careers in forestry sector and to understand, apply, analyze, and evaluate the principles and methods of forest ecology in the real world. The primary objective of forest ecology is to understand what controls the patterns of distribution and abundance of different organisms in forests. The course objectives include: concept of ecology and forest ecosystem; forest community and its characteristics; environmental factors; forestry sampling; forest ecosystem description and analysis; tree Community dynamics; Interactions among forest-ecosystem components; and forest ecosystems and forest types. Alternatively, the course consists of exercises, laps, assignment/indipendent studies and field trip. The graduates must pass all requirements specified in the course.

Knowledge: Graduates will have understanding of the concepts, principle and methods of forest ecology. They understand the role of biotic and abiotic factors determining the distribution of species and productivity of forest ecosystems.

Skills: Graduates must be able to apply the acquired knowledge of forest ecology in their professional working activities. The graduates must be able to apply principles and methods of forestry ecology in assessing the environmental impacts of human activities, to achieve maximum value of forestry resource in terms of goods and services and its relations with other components in ecosystems.

Application of theories to practice: Graduates must be able to apply principles and methods of forest ecology in management of forest resources and further down the value chains of forestry ecosystem goods and services. The students will become experts in the forest ecology when they completing the entire study program, when they will be able to connect and apply the acquired knowledge in their practice

Social knowledge and skills: Graduates become specialists/experts in forest ecology including ability application of knowledge and skillsof forest ecology in forest ecosystem management. Grasduates have a deep knowledge about forest community and its characteristics; environmental factors; forestry sampling; forest ecosystem description and analysis; tree Community dynamics; Interactions among forest-ecosystem components; and forest ecosystems and forest types in their real worlds. The graduates are able to analyze different approaches to the management of forest

resource from the point of view of their characteristic uses. They are competent to evaluate the forest ecosystem goods and services in the midst of that climate change impacts.

6.1 Learning objectives of particular modules

The forest ecology course is divided into eight modules such as: (1) concepts of ecology and forest ecosystem; (2) forest community and its characteristics; (3) environmental factors; (4) forestry sampling for analysis; (5) forest ecosystem description and analysis; (6) tree Community dynamics; (7) interactions among forest-ecosystem components and their environment; and (8) forest ecosystems and forest types.

(1) Concepts of ecology and forest ecosystem. The primary objective of this chapter is to understand what controls the patterns of distribution and abundance of different organisms in forests of the world.

(2) Forest community and its characteristics. This module will focus on community-based forest management in Laos and explore the role of community and user attributes such as group size, social heterogeneities, forest user' perception.

(3) Environmental factors. This module is determined by edaphic (soil) factors and micro-climate (precipitation, light, temperature, and wind). Gas-exchange within forest canopies depends upon the microclimatic condition within the forest, as well as, edaphic factors and water availability.

(4) Forestry sampling. This module is designed for graduates to understand sampling in forestry evolved from the use of plots to more sophisticated surveys with designs based on the concept of stratification, optimal allocation of effort among strata, multistage designs, systematic sampling, and designs with partial replacement of permanent plots.

(5) Forest ecosystem description and analysis. This module will focus on *Forest ecosystems* are areas of the landscape that are dominated by trees and consist of biologically integrated communities of plants, animals and microbes, together with the local soils (substrates) and atmospheres (climates) with which they interact.

(6) Tree Community dynamics. This module is describes the underlying physical and biological forces that shape and change a forest ecosystem. The continuous state of change in forests can be summarized with two basic elements: disturbance and succession

(7) Interactions among forest-ecosystem components. This module is designed for graduates to understand, and apply knowlege and skills in practice with the use of interactions among forest-ecosystem components; and

(8) Forest ecosystems and forest types. This module is designed for graduates to understand, and apply knowlege and skills in practice with the use of forest ecosystems and forest types

7 Course teaching methods

- **Class Meetings:** provide a platform for introducing and reviewing the key concepts, case-studies, and examples as well as for discussion of related current issues.
- **Readings and Quizzes:** Students are expected to have assigned readings before class and must complete a short online review quiz (three attempts, highest grade) on the readings.
- **Assignments:** 5 assignments in total will be handed out on a semi-regular basis. These expand on the practiced work.
- **Lab Component (group work):** Throughout the semester, some classes will be devoted to lab works, where students will be required to complete experiments that allow for hands-on experience with the materials. These labs must then be documented in a graded lab report.
- **Exams:** Accumulated knowledge is tested in two exams: a mid-term and a final exams. Both are closed-book exams and feature multiple-choice, true-false and short essay/illustration questions.

8 Teaching plan

Week	Content	Method/activity	Hours
1	Welcome and introduction to the Forestry Ecology course	Lecturer provides instruction on lesson plan, course description, expected learning outcomes. Students' asignment.	**2**
2-3	**Theory**		**2**
	Module 1 Concept of Ecology and Forest Ecosystem		
	1. Meaning and history of ecological science. 2. Classification of ecological science 3. The importance of forest ecology 4. Forestry ecosystem: goods and services	✓ Lecturer provides the lessons related topics ✓ LCD, Video ✓ Q & A	
	Practice		**4**
	The Organism and Its Environment		

	Exercise: Tropical forest and grassland environment.	Separate students into groups Assignment for making: - Sampling sites - Abiotic Factors - Biotic Factors	
4-5	**Theory**		**2**
	Module 2 Forest community and its characteristics		
	- Definition of Forest Community - Concepts of Forest Community - Basic Characteristics of Forest Society Classification. - Forest Communities in Laos - Plant Community Identification	✓ Lecturer provides the lessons related topics ✓ LCD, Discussion ✓Q & A	
	Practice		**4**
	Forest and Stream Communities		
	-Group presentation on previous exercise. -Exercise: Forest and Stream Communities	Assignment on making: - Create a map of the place of study (River, stream), - Divide the river/stream into 3 parts - Each section (length) is design to collect information as follows: a) Collect elements b) Measure the velocity of the current c) Record living things of both plants and animals	
6-7	**Theory**		**2**
	Module 3 Environmental factors		
	1. Importance of Environmental Factors 2. Environmental factor classification 3. Energy flows in forest ecosystem 4. Climatic Factors 5. Edaphic Factors 6. Topographic Factors	✓ Lecture ✓watch video about the effects of Factors ✓ Q & A	

	7. Forest Fires 8. Biotic factors		
8-9	**Theory**		**2**
	Module 4 Forest sampling		
	1. Segmentation of forest ecology 2. The method of selecting a specimen of tree society 3. Size, shape and number of sample plots 4. Determining the data types to be collected from the sample plots 5. Tree Society Sampling 6. Survey of forest society by using quadrat sampling	✓ Lecture, PPT ✓ Q & A	
	Practice		**4**
	Forestry Sampling		
	Exercise: Rain-forest ecosystems	Assignment: Tropical rain-forest ecosystems in forest protected area: Dong Na Tard PPA 1. Observe the evolution of forest society 2. Record species in tropical rain-forest ecosystems	
10	**Midterm-Examination**		**1**
11-12	**Theories**		**2**
	Chapter 5 Forest Ecosystem Description and Analysis		
	1. Objectives, and analysis of forest ecosystems 2. Guidelines for describing the forest ecosystems 3. Species list of the tree community 4. Methods of density, mean area, frequency and domination in tree Community 5. Stratification measurement	✓ Lecture, PPT ✓ Q & A	

	6. Forest-life form 7. Distribution pattern 8. Associability 9. Coefficient of Community 10. Classification 11. Ordering		
	Practice		
	Community and ecosystem functions		
	Exercise: Primary productivity in forest ecosystem	1. Select the location in 2 different places (in the shade and in the open). 2. Put a plot for example 3 plots 3. Record the species of trees in each plot 4. Use scissors to remove all weeds in the dock. 5. After 21 days, harvest the weeds in the second round	**4**
13-14	**Theory**		
	Module 6 Tree Community dynamics		
	1. The dynamic characteristics of tree society 2. Tree Community Evolution 3. Forest Community Succession 4. Forest Community Fluctuation	✓ Lecture, PPT ✓Video ✓ Q & A	**2**
	Practice		
	Tree litter decomposition		
	Exercise: Tree litter decomposition	1. Soil organisms (Bacteria, Fungi, Macro fauna) 2. Physical factors ((Soil (pH, OC,N,texture); Atmosphere (T, Rain, Humidity)) 3. Fores type and trees 4. Rate of degradation 5. Litter traits	**4**

15	**Theory**		**2**
	Module 7 Interactions Among Forest-Ecosystem Components		
	1. Introduction to forest ecosystem components 2. Relationships among organisms within forestry ecosystems.	✓ Lecturers give suggestions on the lesson ✓ Classroom discussion	
16	**Theory**		**1**
	Module 8 Forest Ecosystems and Forest types		
	1. Mangrove forest ecosystem 2. Peat swamp forest ecosystem 3. Beach forest ecosystem 4. Moist evergreen forest ecosystem 5. Dry evergreen or semi-evergreen forest ecosystem 6. Coniferous or pine forest ecosystem 7. Montane or hill evergreen forest ecosystem 8. Mixed deciduous forest ecosystem 9. Deciduous dipterocarp Forest 10. Savannah ecosystem 11. Tropical grassland forest ecosystem	✓ Lecturer, PPT ✓ Video ✓ Q & A	
17	**Field trip**		**8**
18	**Final examination**		**2**

9 Material needs

- Digital weighing scale FC-si/FC-i: To measure the weight for laboratory
- Polarizing Compound Microscope: A microscope is a laboratory instrument used to examine objects (wood Texture) that are too small to be seen by the naked eye.
- Timer,
- Calculator,
- magnifying glass
- Thermometers
- Angle measurement line.
- Light meter

- pH meter,
- Meters
- Caliper
- Altimeter
- Scissors

10 References

10.1 Compulsory reading list

- Cain A.S and Castro G.M. de O. 1959. Manual of Vegetation Analysis. Harper, New York.
- Coulloudon B. 1999. Sampling Vegetation Attributes, Technical Reference 1734-4, Bureau of Land Management. Denver, Colorado.
- Cuevas C.V., Cervancia R.C., Zafaralla T.A., Lit,Jr. L.I., Barrion_Dupo A.L.A., Lambio F.I.A. 2011. Exploring Ecology. Environmental Biology Division, Institute of Biological Sciences, CAS, UPLB.
- Ibáñez –Fall, 2019. Forest Ecology And Management
- Mueller-Dombois D, Ellenber H. Aim and methods of vegetation ecology. John Wiley and Sons, New York. 1974.
- Shanon CE, Wiener W. The mathematical theory of communications. University of Illinois Press. 1963.
- Somphong CH. 2004. Participatory Forest Management: A Research Study in Savannakhet Province, Laos. Institute for Global Environmental Strategies, Japan.
- Somphong CH. 2016. Human-Plant Diversity Interaction in Dong Na Pard Provincial Protected Area, Lao PDR and Implications for Priority Conservation Planning. PhD Dissertation. University of the Philippines Los Banos, Philippines.

10.2 Suggested reading list

- Barnes, B. V., D. R. Zak, S. R. Denton and S. H. Spurr. 1998. Forest Ecology. Wiley Press. 4th edition.
- Kimmins, J. P. (2004). *Forest Ecology*. 3rd edition. Prentice-Hall Inc., NJ.
- Perry D.A., R. Oren, and S.C. Hart. (2008). *Forest Ecosystems*. 2nd Ed. Johns Hopkins University Press.
- Sharpe, G.W., C.W. Hendee, W.F. Sharpe, and J.C. Hendee. 2003. Introduction to forest and renewable resources. 7th Edition. McGraw-Hill, Inc. Toronto, Ontario. 664 pp.

11 Assessment of students

11.1 Description of assessment

1. Learning will be calculated the percentage score as follows:
   - Class attending 10%
   - Report submission / assignment 20%
   - Mid-term exam 30%
   - Final exam 40%
   - Other

2. The calculation of the grade level shall be based on the evaluation criteria of the course in the National Curriculum Standards.

11.2 Grade distribution and student assessment

- Excellent (A)
  Project surpasses expectations in terms of inventiveness, appropriateness, verbal and visual ability, conceptual rigor, craft, and personal development. Student pursues content or techniques beyond what is discussed in class.
- Above average (B+/B)
  Project is thorough, well-researched, diligently pursued, and successfully executed. Student pursues ideas and suggestions presented in class and puts in effort to resolve required projects.
- Average (C+/C)
  Project meets minimum requirements. Suggestions made in class are not pursued with dedication and rigor. C- does not meet the minimum grade to be counted toward student's degree.
- Below average (D+/D)
  Basic skills including graphics, model-making, verbal clarity or logic of presentation are not level appropriate. Student does not demonstrate required design skill and knowledge base.
- Failure (F)
  Minimum objectives are not met. Performance is not acceptable.
- Excused incomplete (I)
  Given only for legitimate reasons of illness or family emergency, assigned after consultation with Associate Dean's office. A schedule for completion must be agreed upon with Build Lab staff.

Grading scale

Grade		Total score	Scale
Symbol	Verbal grade		

A	(Excellent)	80-100	4,00
B+	(Very Good)	75-79	3,50
B	(Good)	70-74	3,00
C+	(Fairly Good)	65-69	2,50
C	(Fair)	60-64	2,00
D+	(Poor)	55-59	1,50
D	(Very Poor)	50-54	1,00
F	(Fail)	0-49	0,00
I	(Incomplete)		

Place, Date ...../...../.....