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**Salahaddin University**

**Forestry Department**

**College of Agricultural Engineering Sciences**

**Subject: *Silviculture / Practical***

**Course Book For : 2nd year students**

**Lecturer's name: Assist Lecturer, Rushdy R. Aziz**

**Academic Year: Fall Semester 2022-2023**

**Practical part**

**Thursday: 10.30 am - 1.30 pm G (B)** **(Lab. 5)**

 **1.30 pm - 4.30 pm G (A) (Lab. 5)**

**Course Book of (2nd stage forestry)**

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| **1. Course name** | **Silviculture / Practical Part** |
| **2. Lecturer in charge** | **Mr. Rushdy Rokan Aziz** |
| **3. Department/ College** | **Forestry/Agricultural Engineering Sciences** |
| **4. Contact** | **E-mail: rushdy.aziz @su.edu.krd****E-mail: rushdyrokan@yahoo.com****Tel: 07504886122 - 07736963899** |
| **5. Time (in hours) per week**  | **Practical: 6 hours per week.**  |
| **6. Office hours** | **I often present in my office on Sunday 10 - 12 a.m.** |
| **7. Teacher’s academic profile**  | **I completed my (B.Sc.) in Salahaddin University - Erbil, Iraq – Agriculture College - Department of Plant Production in 2007.****I got my (M.Sc.) in Salahaddin University - Erbil, Iraq – Agriculture College - Forestry Department in 2015 and my specialize is Silviculture. I am working as Assist Lecturer in Salahaddin University, Erbil, Iraq – Agriculture College, Forestry Department in 2016.**  |
| **8. Keywords** | **Silviculture , Seeds, Germination, Seed storage,** **Female cone,** **Angiosperm,** **Gymnosperm,** **Seed collection.**  |
| **9. Course overview:**  Silviculture is one of the most important branch science of forestry. It was defined by **Shafiq** **Y.** (1988): as the integrated science which looks at the principles of development and improvement of forests, beginner by topics of forest tree seeds, and ending by sustained economical production in the studied comprehensive plan. Based on this definition, study of forest tree seeds is the main subject of Silviculture and it is the basic unit to make a forest either naturally or artificially.  |
| **10. Course objective:****1 -** Student must be know how the seed be formed after process of pollination and fertilization in the flower.**2 -** Student must identify signs of fruit maturity. **3 -** Student must know how to collecting seeds and fruits, seed extract, store, and show the machines, tools and equipment and how to use for this purpose. **4 -** Students learn how to deal with seeds to determine the vitality of seeds by many important laboratory tests such as sampling, the rate of purity, thousand seed weight, determine the vitality of seeds....**5 -** Student must identify the reasons for the inability of seeds to germinate (Dormancy) and conduct pre-treatments for the purpose of breaking dormancy that found in some species and treatment according to type of seeds for the purpose of speed up and increase the germination rate and uniformity during the production of seedlings in nurseries. |
| **11. Student's obligation** Students will be asked to prepare research papers on selective topics. There will be classroom discussions and the lecture will give enough background to evaluate problems sets, and different issues discussed throughout the course. To get the best of the course, it is suggested that you attend classes as much as possible, read the required lectures, teacher's notes regularly as all of them are foundations for the course. Lecture's notes are for supporting and not for submitting the reading material including the handouts. Try as much as possible to participate in classroom discussions, preparing the assignments given in the course. Using **quiz, exams, a laboratory practical and a seed collection, seed extraction, germination test , vitality test.**  |
| **12. Forms of teaching**Different forms of teaching will be used to reach the objectives of the course: 'power point presentations for the head titles and definitions and summary of conclusions, give the students lecture as fascicule also using the white board to clear the figures and meaning of words….. , using different seeds sample which presented in lab as viewed sample. |
| **13. Assessment scheme**All students should be presented in the lab. Quiz will be conducted every lectures with giving **5** minutes to the students. The mean of **two exams** will be out of (**25**) marks and (**10**) marks for Student activities for practical part with general total (**35** marks).‌ **1- Quiz and student activities 10 mark** **2- Test 25 mark** **3- Total 35 mark** **4- Final Examination 0** **Total 35 mark** |
| **14. Student learning outcome:**Differentiate between Forest seeds and other relatives of seeds. Be able to classify the different order or families of forest seeds such as present it in cone or pods, capsule, flesh fruit, winged seeds or fruit…. How to collect the seeds by using different methods .Be able to deal with the collecting seeds like extraction the seeds and how to store the seeds under storage condition. Be able to Analysis the seeds by using different seeds testing such as purity, moisture content ,weight of 1000 seeds, germination , viability test . |
| **15. Course Reading List and References‌:**▪ **Useful References: -** - Willan, R.L. (1985) A guide to forest seed handling. Reprinted 1987- Singh, V. and Lavania, S.K. (2003). Forest Tree seeds and Nursery Management. Bishen Singh. Indian.- Schmidt, L. (2007) Tropical Forest Seed. Springer-Verlag Berlin Heidelberg New York.- BISHT, N.S. and AHLAWAT, S.P (1999 ) SEED TECHNOLOGY. Itanagar - 791 111 (India).- Bonner, F. T. , Vozzo, J. A., Elam, W. W., and Land, S. B. (1994) Tree Seed Technology Training Course. United States Department of Agriculture Forest Service .- Friday, J. B.(2000) Seed Technology for Forestry in Hawaii. University of Hawaii at Manoa. www2.ctahr.hawaii.edu/oc .**Arabic References:** * ولي ،صدرالدين بهاء الدين ( 1990) الانبات وسبات البذور. كلية التربية.جامعة موصل.
* السيد ،عبدالوهاب بدرالدين (1993). بذور الاشجار الخشبية و انتاج شتلاتها. كلية الزراعة. جامعة الاسكندرية
* عبدالله , ياووز شفيق و الكناني ، عادل ( 1985) مشاتل الغابات. كلية الزراعة و الغابات. جامعة الموصل.
* عبدالله , ياووز شفيق (1984). بذور اشجار الغابات . كلية الزراعة و الغابات. جامعة الموصل.

**▪ Magazines and review (internet):**<https://en.wikipedia.org/wiki/Seed><http://www.britannica.com/plant/gymnosperm><http://www2.estrellamountain.edu/faculty/farabee/Biobk/BioBookDiversity_6.html><http://www.fao.org/docrep/006/ad232e/ad232e07.htm>/www.seedtest.org/en/international-rules-\_content---1--1083.html<http://www.agriculture.gov.ie/animalhealthwelfare/laboratoryservices/seedtestinglaboratory/> |
| **17. Practical Topics (If there is any)** | **Lecturer's name** |
| **Week: 1*** **Definition of Silviculture.**
* **Seeds of Forest tree is an important subject of Silviculture.**
* **Formation of seeds in Angiosperms, Definition and composition of flowers and the processes that occur in them to the composition of the seed and fruit ,** **Formation and composition of the pollen grain,** **Formation and composition of embryo sac.**

**Week: 2*** **Formation of seeds in Gymnosperms,** **Pine life cycle, male cone, female cone.**
* **Structure of seed.**

**Week: 3*** **Seed collection.**
1. **Choose groups of trees to collect seeds from them.**
2. **Stages of fruit ripening.**
3. **Signs of maturity of the fruits and seeds.**
4. **Methods of seed and fruits collection of the trees.**
5. **Machines and tools for collecting seeds..**

**Week: 4****Scientific trip to the** **Sami Abdul Rahman park for the purpose of fruit and seed collection.** **Week: 5** ***The First Examination.*****Week: 61 Seed extraction.** **2 - Seed extraction from cones.** **3 - Seed extraction from fleshy fruits.** **4 - Seed extraction from the winged** **fruit.** **5 - Seed extraction from the pods and capsules.****Week: 7 - Seed storage. Some essential points that must be followed when storing seeds,** **natural longevity of seed, factors affecting seed longevity,** **storage containers, storage conditions.Week: 8****Seed testing, Sampling of seed for testing, Methods of mixing, Simple seed testing, Seed analysis, Seed weight.****Week: 9*****The Second Examination.*****Week: 10****Moisture content,** **Seed viability tests, Germination test, Cut test, Chemical test, X-ray test.****Week: 11****Scientific trip to the Seed Laboratory in the Agriculture Research Center.** **Week: 12*** **Pruning.**
* **Methods of pruning.**
* **Thinning.**
* **Type of Thinning.**

**Week: 13*** **Seed dormancy.**
* **Types of seed dormancy**
* **Pre-treatments to break seed dormancy.**
 | **Mr. Rushdy R. Aziz** **ex: (6 hrs)** |
| **18. Examinations:**1. ***Answer the following:-***

- what is tetrazolium , for which cases uses it then write the equation. - Calculate the number of seed. ***2.******True or false type of exams:***Answer the following sentences with T (True) or F (False)and then correct the fault: 1-In gymnosperms Male cones are normally bigger than female cones.2-Chemical signs depend on the estimating of moisture content of the fruit or the chemical composition of their protein and fat. 3-Macro biotic seed life span from 15- over 100 years. 4- Homogeneity within the seed lot should be assured by thorough mixing.5-Flower typically contains six types of highly modified leaves.6-Eucalyptus seed have an impermeable seed coat. 7-To test the M.C. in the seed it is placed in an oven at 103-+30 for 2 hr. 8-Abnormal seedlings show the potential for continued development into satisfactory plants under favorable environmental conditions. 9-Embryo consists of radical, plumul and cotyledon. 10-Purity analysis is the second test to be carried out for seed test.***3. Multiple choices:*** 1- It is used to examine the internal structures of the seed. (tetrazolium, germination test, X- radiography) 2- The seed coat and materials within the endosperm not hardens in this kind of seed and sow seeds directly after collection in several days and is not for storage. (Physiological maturity, Perfect maturity, morphological maturity) 3- Sampling can be done with special tool called (spoon, probe, pen) 4- Purity estimated by (weight of the sample being tested, mc of sample, shape so sample) 5- %; show the potential for continued development into satisfactory plants under favorable environmental conditions (Abnormal seedlings, Normal seedlings , Ingerminated seed).***4. Drawing***e.g. Typical structure of flowers.e.g. Typical seed structure. ***5. Fill the blanks with suitable words* *or sentences:*** 1- Angiosperms are …………. plants that produce ………….. and fruit with one or more seeds.  2- The applicable of seed for sowing depend on two main factors 1-………………2-………………. ***6. Enumerate the following:***  1- There are different methods to get the required sample size for testing. 2- The main purposes of seeds storage.***7. Definitions:***Silviculture , Angiosperms , Seed testing , Flower , Pollination , Seed storage, Gymnosperms.   |