NRM 150
PLANT PROPAGATION – I. Seeds and Seed Germination

1 credit (1+0)
Prerequisites: none; recommended basic high school biology
Location: 183 Arctic Health Bldg (AHRB)
Time: TBA (1 hr per week, 14 weeks; 2 hour final)

Instructor: Dr. Patricia S. Holloway
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Textbook: Beyl, C. and R. Trigiano. 2008. Plant Propagation Concepts and Laboratory exercises. CRC Press, New York.

Course Description:
Principles and practices of plant propagation useful in horticulture, botany, forestry, agronomy, revegetation and land reclamation projects and plant research. Course will cover seed and fern spore biology, seed dormancy mechanisms, germination techniques, and the seed industry. Emphasis will be on Alaska native and economically useful plants.

Prerequisite: none
Recommended: basic course in high school biology. (1+0)

Goals and Objectives
The propagation of plants by seeds, cutting, grafting and more is the foundation of plant-based natural resources management. This course is part one of a three-part series exploring the theory and methods of propagating plants. It is designed to provide natural resource managers with basic knowledge in plant regeneration by seeds and fern spores and an exploration of the seed industry. The lectures and assigned activities explore the fundamental basis for reproduction in plants and the methods by which we use natural processes to propagate plants for use in horticulture, agronomy, forestry, revegetation and reclamation.

Student Learning Outcomes
It is expected that you will become familiar with the theory and practice of plant propagation by seeds and fern spores sufficient for entry level positions in a commercial greenhouse/nursery; tree seedling nursery; on revegetation sites such as mining, wetlands, highway; and on commercial or residential farms and gardens. You will develop a working knowledge of seed germination terminology and techniques to allow you to

pursue specific interests as well as practice problem-solving skills for researching and making management decisions in resources management.

Instructional Methods:
The basic course will use Blackboard as the main interface for exams, presentation of videos, YouTube and more. Methods will include:
1) Online or classroom powerpoint lecture
2) Audio/video demonstrations using Powerpoint, Camtasia, Youtube
3) Propagation terms- a combination of puzzles, quizzes, matching, short answer
4) Situational essays: essays answering questions about how seeds are harvested, processed, used, that require independent research of literature, analysis and problem solving in natural resources management
5) Videos or production practices for seeds
6) In-class or distance discussions about the biology and/or business of seeds

Technology Requirements
One section of this course will be online and will use several multimedia technologies accessible through Blackboard. Lectures will be recorded using Powerpoint/Camtasia/Youtube and will require audio and video capabilities. There are no requirements to purchase additional software. Students will be expected to have the most current versions of several applications that will be used in this course, including QuickTime, Flash (Mac|Windows), iTunes and Java. Before the first online class meeting, please visit the OIT website to make sure all of your systems are up to date.

Evaluation:

Weekly vocabulary quiz/game, etc. (12)	120 points	A= 90-100%
Situational essays (5)	125	B= 80-89%
Video commentaries (5)	125	C= 70-79%
Mid-term exam	50	D= 60-69%
Final exam	50	F= Below 60%
	470	

Weekly vocabulary quizzes/games: (10 points each, 120 points) A weekly quiz (open book) will be given using a variety of tools such as crossword puzzles, short answer, fill in the blank, etc. that give students opportunities to learn the unique vocabulary of plant propagation. There will be 12 quizzes in a semester and must be completed on Blackboard within one week of the class time.

Situational essays: (25 points each, 125 points) An essay question will be given approximately every two weeks that require a search of the literature and exploration of the seed biology or industry. Essays will be 5 pages (dble space) or less and must include referenced sources of information. They will be made available on Blackboard and will be due one week from assigned date. A required citation style will be provided.

Exams: Two exams will be given, a mid term and a final. Using a mixture of short answer, fill in the blank, and essay, the exams will cover a review of materials for one half of the course. The final is not cumulative, however because of the nature of the course content, material from the first half will be required to answer questions from the second half.

Course Policies:

Plagiarism and Academic Honesty
Plagiarism is using what another person has developed as your own words or thoughts. Plagiarism is never acceptable. UAF requires students to conduct themselves honestly and responsibly and to respect the rights of others. Cheating, plagiarism or other forms of academic dishonesty may result in disciplinary action and sanctions. The UAF Student Code of Conduct is adhered to in this course.

Disability Services
The UAF Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Your
instructor will work with the Office of Disability Services (208 WHIT, 907-474-5655) to provide reasonable accommodation to students with disabilities.
UAF Disability Services for Distance Students UAF has a Disability Services office that operates in conjunction with the College of Rural and Community Development (CRCD) campuses and UAF Center for Distance Education (CDE). Disability Services, a part of UAF Center for Health and Counseling, provides academic accommodations to enrolled students who are identified as being eligible for these services. If you believe you are eligible, please visit the Office of Disability Services on the web or contact a student affairs staff person at your nearest local campus. You can also contact Disability Services on the Fairbanks Campus at (907) 474-5655, fydso@uaf.edu.

Make up quizzes and exams will be given only in emergency situations. (Note from Dean, Physician, Employer).

Incomplete grades: Incompletes will be given only in the case of family or medical emergencies or circumstances beyond your control. You must have a C- or better average in the class, have attended all of the classes and labs, and shown good progress toward completing the course BEFORE the emergency in order to receive an incomplete grade.

Audits: Auditing the class is accepted but not recommended. You must complete all work, including the exams, readings and lab reports. They simply won't be graded but will receive full feedback from the instructor. If exams, etc. are not completed, the instructor will initiate a withdrawl from the class.

Spelling and Grammar: On all written papers including essays and exams, you will lose points for poor spelling and grammar.

Tentative Schedule (by week)

1. Course introduction: The importance of seeds to humans and processed products resulting from seeds: waxes, oils and fats; medicines; spices and condiments; agriculture; bird and wildlife food; domestic animal feed; cosmetics; aromatic compounds; beverages; ornamental decorations. Main crops propagated by seeds esp agronomic crops, flower and vegetable seeds, tree seeds. (quiz 1, essay 1)

2. Where seeds come from - flower initiation: the development of flowers in annuals, biennials and perennials and the process by which flowers are formed; environmental factors that influence flower initiation and development; recognizing flower buds and when they occur. (quiz 2, video commentary 1)

3. Flower development: mitosis, meiosis, results of these processes (quiz 3, essay 2)

4. Pollination and production of seeds – types of pollination; the special case of honey bees; wild Alaska abiotic and biotic pollinators; pollination in naturally cross pollinated and self pollinated crops; the consequences of inadequate pollination. (quiz 4, video commentary 2)

5. Hybrid seed production and incompatibility - selfing versus cross pollination and how plants prevent self pollination (timing differences, incompatibility). The invention of the F1 Hybrid. (quiz 5, essay 3)

6. A bit of anatomy - the anatomical components of seeds and how they affect germination, Fruit and fruit ripening, where to find fruits and seeds. (quiz 6, video commentary 3)

7. Mid term exam

8. Seed Processing: harvesting, extraction, cleaning, drying, storage. (quiz 6, essay 4)

9. Seed conditioning - color, texture, size sorting, gravity separation, seed treatments such as pelleting, color coding, primed seeds, etc. (quiz 7, video commentary 4)

10. Seed germination: the process of germination, the germination environment, methods to hasten germination (quiz 8)

11.Seed dormancy- mechanical, chemical, physical, secondary (quiz 9)

12.Methods of overcoming dormancy (stratification, scarification, etc.) (quiz 10, essay 5)

13.The seed industry Seed quality: seed purity, noxious weeds, moisture content, seed size Seed testing: Association of Official Seed Analysts (AOSA), International Seed Testing Association, Society of Commercial Seed Technologists (SCST) International Seed Testing Association (ISTA)American Seed Trade Association (ASTA), USDA Agricultural Marketing Service (USDA/AMS) Seed Testing ServiceCanadian Food Inspection Agency (CFIA), Association of Official Seed Certifying Agencies (AOSCA) Association of American Seed Control Officials (AASCO), Seed Quest, National Seed Health System, Alaska Division of Agriculture Seed testing Program (quiz 11, video commentary 5)

14.Seed certification- Alaska Division of Agriculture Seed testing, noxious weed program (quiz 12)

15.Final Exam