SYLLABUS – NATURAL RESOURCES 459/659
ECOSYSTEM MANAGEMENT & RESTORATION
Spring, 2019

GENERAL COURSE INFO.:
Lecture: 9:00-9:50 T, R TNR 255
Discussion: 8-9:50 Friday, TNR 255
Instructor:
Dr. James Cook (346-2269; jcook@uwsp.edu). Office: 242 CNR
Office Hours: M 9-11; T 2-4; W 9-10; R 10-11; F 1-2:45
Prerequisites: Summer Camp or the Eur. Environmental Seminar; FOR 332 or BIOL 305 or BIOL 355; NR 458 or WLDF 458.

COURSE OBJECTIVES:
The overarching goal of this course is provide the ecological and technical background for ecosystem management so you can analyze the need for, and effectively plan, ecosystem management and restoration projects in a specific, socio-political context. You will attain a broad understanding of: 1) ecological and conceptual underpinnings of ecosystem management & restoration; 2) ecosystem function of forest, grassland, floodplain and wetlands, 3) restoration and monitoring techniques, and 4) social and political constraints.
**Scope:** The emphasis is on the structure and function of landscapes, and the forest, grassland and wetland ecosystems they contain. Though the protection and enhancement of biodiversity are important objectives, they will not be emphasized in NR459 because this topic is covered thoroughly in NR 458/WLDF 458.

COURSE STRUCTURE: THIS IS RATHER UNIQUE – PLEASE READ CAREFULLY!
Because this course is the Capstone Course for the Ecosystem Restor & Mngt. [ER&M] Option, but not all class members are in that major, the class has two tracks – one for the ER&M majors, and and a second for all other majors. The assignments and grade determination differ between these two groups. The major difference is that the ER&M majors will complete a group project and present their plan to the class. The second half of the Discussion on Friday is for ER&M majors only. On a couple of Fridays in March, the ER&M majors will go to the field, and on those days the other majors will have a day off.
**Organization of Lecture Content [this applies to all]:**
I. Foundations of ecosystem management (EM) and restoration
II. Importance of temporal scales, spatial scales, uncertainty & disturbance regimes
III. Overview of landscape, forest, river+floodplain, grassland and wetland ecology
IV. Role of genetics in EM&R
V. Adaptive management & monitoring
VI. Restoration techniques
VII. Case studies – San Juan Mts., NWFP, Moses Creek
VIII. Role of climate change in ER&M

Text: There is not a text for the course. Journal articles are used extensively, and will be made available in CANVAS. All powerpoints and outlines are posted in Canvas.

LECTURE SCHEDULE, TOPICS & READINGS:

| Week | Date | Topic | Reading Assignment | Instructor |
|---|---|---|---|---|
| 1 | 1/22 | Evolution of EM | Grumbine 1994 | Cook |
| 1 | 1/24 | What is restoration? Charac's of targets; HRV | Moore et al. 1999 ; H/O^ | Cook |
| 1 | 1/25 | A. Temporal scales***<br>B. Introduction to project | -----<br>H/O | Cook |
| 2 | 1/29 | Issues of temporal scale – reliability of the record | Swetnam et al. 1999 | Cook |
| 2 | 1/31 | Uncertainty – why, and how to address | Samuels & Lockwood 2002 | Cook |
| 2 | 2/1 | A. Issues of spatial scale in EM & restoration<br>B. Context, constraints, objectives of unit | Hobbs 2003, pg. 223-227; sections 3.3, 4.6 | Cook<br>Rose? |
| 3 | 2/5 | Spatial scale – complete | ----- | Cook |
| 3 | 2/7 | Landscape ecology | ----- | Cook |
| 3 | 2/8 | A. Ecosystem processes - terrestrial<br>B. Informational needs – EM plan | -----<br>Goebel et al. 2005 | Cook |
| 4 | 2/12 | Wetland processes | ----- | Hermann** |
| 4 | 2/14 | Role of disturbance, importance of disturb. regime (DR) | Sousa 1984, pg. 353-380 (skip 362-63) | Cook |
| 4 | 2/15 | A. DR (compete)<br>B. Disturb regimes – Greak Lakes region | ----<br>Brose et al. 2014, Chap. 2 | Cook |
| 5 | 2/19 | Disturbance regime (DR) based EM | Cissel et al. 1999 | Cook |
| 5 | 2/21 | DR based EM - complete | ----- | Cook |
| 5 | 2/22 | A. Disturb. regimes other systems<br>B. Plan process, goals | -----<br>Allen et al. 2002 | <br>Cook |
| 6 | 2/26 | Role of genetics | ------ | Cook |
| 6 | 2/28 | Role of genetics - complete | Bischoff et al. 2010 | Cook |
| 6 | 3/1 | A. Prep for exam<br>B. Landscape influences | ----- | <br>Cook |
| 7 | 3/5 | EXAM #1 | ----- | Cook |
| 7 | 3/7 | Adaptive Mngt. & Monitoring | Haney and Power 1996 ; H/O | Cook |
| 7 | 3/8 | A. Monitoring, completed | | |

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|---|---|---|---|---|
| | | B. Discuss outline, refine; prepare for site visit | ----- | Cook |
| 8 | 3/12 | Restoration techniques – forests | | Cook |
| 8 | 3/14 | Forest techniques – complete; S.J. Project | H/O(2) | Cook |
| 8 | 3/15 | Site visit – Restor. Majors | To the field* | Cook |
| 9 | 3/26 | Grassland ecology & dynamics | Knapp et al. 1999 | Cook |
| 9 | 3/28 | Function & restor. – grasslands | Rowe 2010 | Cook |
| 9 | 3/29 | Site visit – Restor. Majors | To the field* | Cook |
| 10 | 4/2 | Case study: Northwest Forest Plan – background, objectives | Thomas et al. 2006 | Cook |
| 10 | 4/4 | NWFP – presciprtion & evaluation | Davis et al. 2011 – Abstract+ Summary | Cook |
| 10 | 4/5 | No class – CNR URS | ----- | ----- |
| 11 | 4/9 | Riverine/floodplain ecology | ----- | Cook |
| 11 | 4/11 | Floodplain restoration | Molles et al. 1998 | Cook |
| 11 | 4/12 | Management of SNA's (WI) | ------- | Nooker** |
| 12 | 4/16 | Restor. Tech's – wetlands | Hazelton et al. 2014 | Gumtow** |
| 12 | 4/18 | Case study - Moses Creek, History & Overview | ----- | Bucholz** |
| 12 | 4/19 | A. **Moses Creek – meet on site @ bridge, north end.*** B. Nothing scheduled; field discussion lasts until 9:30 | Field* | Cook |
| 13 | 4/23 | Plant community assessment – metrics | {Matthews et al. 2009, Mushet et al. 2002} | Cook |
| 13 | 4/25 | Complete 'assessment metrics'; begin Challenges of EM on NIP lands | ----- | Cook |
| 13 | 4/26 | A. Complete "Challenges" B. Flex time – prepare! | ---- | Cook |
| 14 | 4/30 | Landscape-level habitat mngt | Haufler et al. 1996 | Cook |

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|---|---|---|---|---|
| 14 | 5/2 | Group presentation (1) | ----- | Student group |
| 14 | 5/3 | Group presentations (2) | ----- | Student group |
| 15 | 5/7 | Restoration & climate change | Harris et al. 2006 | Cook |
| 15 | 5/9 | Catastrophic fires – what do they mean for EM? | Stephens et al. 2014 | Cook |
| 15 | 5/10 | Review for final | ----- | Cook |

^ H/O means that a handout will be provided; TBA means to be announced
***= The topic under 'A' is for the first half of the period; 'B' is for the second half
** These are tentative dates. Each involves a trip off campus or a guest speaker. I will confirm these dates or announce the changes as soon in the semester as I can. These will also be posted in Canvas.
*=yes, we are going to the site so be prepared

GRADE DETERMINATION

| ER&M majors Weightings: | | All other majors Weightings: | |
|---|---|---|---|
| 1st hour exam……. | 25% | 1st hour exam | 30% |
| Final exam (comprehensive) | 30% | Final exam | 40% |
| Project presentation……. | 22% | Article synthesis | 12% |
| Group report…… …….. | 10% | Critique of present. | 8% |
| Outline | 5% | Evolution. Envir. | 10% |
| Peer evaluation ……... | 8% | | |

FINAL EXAM: Wed.., 5/16, 12:30-2:30 pm

Grades on assignments and the final grade will be assigned as follows: 92.5+ = A; 89.5-92.4 = A-; 86.5-89.4 = B+; ETC. If you are late turning in the Group Report or Article Synthesis a penalty will be assessed between 5 – 30% based on how late the assignment is.

RESTORATION MAJORS:
Project Presentations: You are expected to prepare a **35-45 minute presentation** with appropriate visual aids. At least 2 people from the group must present. Provide the class with a hardcopy outline of your presentation. More detail will be provided in discussion.
Group Report: This will be a summary of your presentation, an outline and the resources you used (literature cited). It is due May 8th. More detail will be provided in discussion.

OTHER MAJORS:
1) For the 'Evolutionary Environment' assignment you need to select a specific ecosystem from the temperate or boreal regions of the world. As for #1, it may be terrestrial, wetland or aquatic, but not marine. Using one or more published sources [books and/or refereed articles], describe four factors that are important parts of the "evolutinary environment' [per Moore et al. 1999] for the system. You may not use any of the articles in the list below. Attach the citation of any article(s), and other resources, you use to complete this. This assignment is DUE March 15th.

2) For the 'Article Synthesis' assignment, you must select an article, OTHER THAN THE ONES WE DISCUSS in CLASS, that describes restoration of a community. It may be any terrestrial or non-marine aquatic ecosystem in the temperate or boreal zone. The article must describe at least one treatment, an outcome [Result], and an evalulation of the 'success' of the treatment. Write a one-to-two page summary of this article that includes a) objective(s), key methods and the treatment(s) performed, results, and short conclusion. This assignment is DUE April 5th. Attach the full citation of the article to the end of your synthesis.

3) Critique of Presentation – you must attend one of the student presentations and critique it. A form will be provided. If you attend and critique a second one, you will get extra credit.

ATTENDENCE POLICY:

I expect your interest in the topic will motivate you to be in class unless there is a personal emergency or illness. No penalty will be imposed for missing a lecture. Because we do not have a text, and only a portion of the content comes from the readings, it will improve your performance and understanding SUBSTANTIALLY by attending all lectures. You are expected to meet schedule changes that are announced in class, even if you were not present.

STUDENT RESPONSIBILITY

It is your responsibility to be FULLY prepared to discuss the assigned readings, and to get ALL notes if you miss a lecture. If you have an emergency or are ill, accommodations will be made, but it is your responsibility to inform, **in writing,** why you missed. Also, if any material is not clear, YOU have to let me know; I will be happy to sit down with you one-on-one and discuss it as much as needed. As always, you are expected to follow the U.W. System rules for student conduct.

Citations for assigned lecture readings (just in case you need one or two):

Cissel, John H., Frederick J. Swanson and Peter J. Weisberg. 1999. Landscape management using historical fire regimes: Blue River, Oregon. Ecol. Applications 9:1217-1231.

Davis, R.J. and others. 2011. Status and trends of northern spotted owl populations and habitats. USDA For Serv., Gen.. Tech. Rep. PNW-GTR-850.

Grumbine, R.Edward. 1994. What is ecosystem management? Conserv. Biol. 8(1):27-38.

Haney, Alan and Rebecca L. Power. 1996. Adaptive management for sound ecosystem management. Environ. Mngt. 20(6):879-86.

Harris, J.A., R.J. Hobbs, E. Higgs and J. Aronson. 2006. Ecological restoration and global climate change. Restor. Ecol. 14(2):170-176.

Haufler, J.B., C.A. Mehl and G.J. Roloff. 1996. Using a coarse-filter approach with species assessment for ecosystem management . Wildlife Society Bulletin 24(2):200-208.

Hazelton, E. L., Mozdzer, T. J., Burdick, D. M., Kettenring, K. M., & Whigham, D. F. 2014. Phragmites australis management in the United States: 40 years of methods and outcomes. *AoB Plants*, *6*, plu001.

Hobbs, N. 2003. Challenges and opportunities in integrating ecological knowledge across scales. For. Ecol. & Mngt. 181:223-238.

Knapp, Alan and others. 1999. The keystone role of bison in North American tall grass prairie. BioSci. 49(1):39-50.

Matthews, Jeffrey W., Greg Spyreas and Anton G. Endress. 2009. Trajectories of vegetation based indicators used to asses wetland restoration progress. Ecol. Appl. 19(8):2093-2107.

Molles, M.,C., Jr., C.S. Crawford, L.M. Ellis, H. M. Valett and C.N. Dahm. 1998. Managed flooding for riparian ecosystem restoration. BioSci. 48(9):749-56

Moore, M.M., W.W. Covington and P.Z. Fule. 1999. Reference conditions and ecological restoration: a southwestern ponderosa pine perspective. Ecol. Applic. 9(4):1266-77.

Mushet, David M., Ned H. Euliss, Jr. and Terry L. Shaffer. 2002. Florisitc quality assessment of one natural and three restored wetland complexes in North Dakota, USA. Wetlands 22(1):126-138.

Samuels, Corey L. and Julie L. Lockwood. 2002. Weeding out surprises: incorporating uncertainty into restoration models. Ecol. Restor. 20(4):262-68.

Stankey, George H., B. Bormann, C. Ryan, B. Shindler, V. Sturtevan, R. Clark and C. Philpot. 2003. Adaptive management and the Northwest Forest Plan. J. For. 101(1):40-46.

Stephens, S., N. Burrows and others. 2014. Temperate and boreal forest mega-fires: characteristics and challenges. Frontiers Ecology & Environment 12(2):115-122.

Swetnam, T. C.D. Allen and J.L. Betancourt. 1999. Applied historical ecology: using the past to manage for the future. Ecol. Appl. 9(4):1189-1206.

Thomas, Jack W., J. F. Franklin, J. Gordon and K. Johnson. 2006. The Northwest Forest Plan: origins, components, implementation experience and suggestions for change. Conser. Biol. 20:277-287.