Fish Population Dynamics

Course: Water 353/553, Fall 2022, 4 credits

Description: Mathematical analysis of fish population dynamics and demographics. Use of sampling and models for estimating survival, growth, recruitment, and abundance in fish populations.

Lectures: Monday, Wednesday, & Friday, 9:00-9:50, TNR 252

Laboratory: Tuesday, 2:00-3:50, TNR 322

Instructor: Joshua K. Raabe, PhD

Contact Information: jraabe@uwsp.edu, TNR 174, 715-346-2689 (office phone)

Office hours: Monday, 11:00-12:45; by appointment (e-mail first); or just stop by my office whenever door is open

Goal: My overall goal is for students to understand why studying population dynamics is important and to develop basic skills to answer applied fisheries and ecological questions.

Objectives: By the end of the semester, students should be able to:
1. Describe the key concepts of population dynamics
2. Explain how and why different methods are used to answer questions
3. Run basic models and statistics in computer software
4. Interpret output from basic models and statistics

Communication: Students are expected to routinely check their UWSP e-mail and Canvas course site for updates and materials.

Canvas: https://uwstp.instructure.com/courses/523045

Text: Guy, C. S., and M. L. Brown. 2007. Analysis and interpretation of freshwater fisheries data. American Fisheries Society, Bethesda, Maryland. (Text Rental)

Additional Materials: Additional lecture and lab materials will be available on Canvas. Students may view handouts online or print on their own. Text and handouts should be read *prior* to attending lecture and lab. Computers are provided for use in the lab.

WATR 553: Graduate students will be held to a higher standard for grading, have an additional assignment, and be expected to assist undergraduate students.

Lecture Attendance: I will not take attendance for lectures, outside of the first day and scientific paper discussion days. However, I have noticed that your success in this course will likely be related to the amount of time you invest in preparation and your extent of classroom discussions and activities.

Scientific Papers (40 points): To encourage learning from real studies, four times over the course of the semester each student will find a peer-reviewed scientific paper related to specific topics, upload a PDF of the article and a short summary to Canvas (7 points), post under another student's paper (1 point) and discuss in class (2 points).

Quizzes & Surveys (35 points): To encourage students to stay up to date on course materials, provide practice problems, and for me to receive feedback, there will be class surveys & content quizzes covering lecture materials on Canvas.

Exams (400 points): Four 100 point exams will each cover one-fourth of the lecture & lab material; exams are not cumulative although certain aspects and calculations will carry throughout the semester. To allow for adequate time, each exam will be taken: 1., during a 2-hour laboratory (optional review during normal class period prior to exam) or 2., during the final exam period. These will be online with open resources (notes, internet, etc.) and additional time will be provided. However, you will take the exam in TNR 322 and cannot receive materials from other people or interact with anyone during the exam. Each exam must be taken at the scheduled time or a score of zero will be assigned. Illness or family emergency may be cause for re-scheduling an exam, but only if you notify me *prior* to the exam period (email and voice-mail have date and time stamps).

Laboratory Attendance (10 points): Laboratory attendance (1 point per lab) is required to ensure that each student is understanding and completing lab materials, and so that I can assist in a timely manner. Given there are 10 points total, two labs can be missed without losing any points, and if you attend all labs you will receive two bonus points. Expect all labs to go to 3:50.

Laboratory Assignments (115 points): Each laboratory activity will have an associated assignment. All labs should be completed, as they will relate to topics covered on the exams. The assignments will require you to complete analyses and interpret the results. You may need to do additional research to answer questions.

Assignments should be submitted onto Canvas by 11:59 PM on the due date. ***All assignments will be deducted 10% for each day late*** *(e.g., 1 point/day for 10 point assignment)*, so please submit in a timely manner to avoid reductions or a score of zero.

Grade Breakdown: Grades will be determined based on student's total points at the end of the semester. Participation and effort can be factored in for the student's benefit.

Category	Points
Exams (4)	400
Papers (4)	40
Quizzes/Surveys	35
Lab Assignments	115
Lab Attendance	10
Total	600

Grade	Points	Percentage
A	558 - 600	93 - 100%
A-	540 - 557	90 - 92.9%
B+	522 - 539	87 - 89.9%
B	498 - 521	83 - 86.9%
B-	480 - 497	80 - 82.9%
C+	462 - 479	77 - 79.9%
C	438 - 461	73 - 76.9%
C-	420 - 437	70 - 72.9%
D+	402 - 419	67 - 69.9%
D	360 - 401	60 - 66.9%
F	≤ 359	$\leq 59.9\%$

Classroom Environment: I want everyone to feel comfortable and willing to participate in this course and will work to keep a positive classroom/online environment. Please contact me if you have any issues with a classmate or me. In addition, UWSP values a safe, honest, respectful, and inviting learning environment. In order to ensure that each student has the opportunity to succeed, they developed a set of expectations for all students and instructors, known as the *Rights and Responsibilities* document:

http://www.uwsp.edu/dos/Documents/Right%20and%20Responsibilities.pdf

Student Feedback: To help improve this course and my teaching throughout the semester, I will ask for feedback during class periods, through surveys, and you can always talk to / email me or you can provide *anonymous* feedback through an online survey (link below and also on Canvas). I will try to incorporate all constructive, well-stated suggestions and critiques. I also greatly appreciate completed UWSP course evaluations at the end of the semester.

https://www.surveymonkey.com/r/HZCL85X

Academic Integrity: I expect all students to strictly adhere to the high level of conduct and academic integrity at UWSP. All forms of plagiarism, cheating, and academic dishonesty are prohibited; violations will follow UWSP procedures. I reserve the right to use plagiarism software on assignments. The minimum penalty for a violation of academic integrity is failure (score of zero) of the assignment, but penalties can be stricter. For more information, please see the UWSP "Student Academic Standards and Disciplinary Procedures" section of the *Rights and Responsibilities*, Chapter 14:

https://www.uwsp.edu/acadaff/Orientation/AcademicMisconductRulesAndProcedures_booklet.pdf

Disability Policy: If you are a student with disabilities, please contact me at the beginning of the semester. We will work together to accommodate any disabilities according to UWSP policies and the Americans with Disabilities Act (ADA), a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. Students must register with UWSP Disability and Assistive Technology Center and provide proper documentation. For more information, please visit the links below and the Disability and Assistive Technology Center, located on the 6th floor of the Learning Resource Center (the Library).

http://www4.uwsp.edu/special/disability/

Safety Procedures: *Medical emergency*: call 911 or use the hallway red emergency phone, offer assistance if trained and willing, guide emergency responders to victim. *Tornado warning:* remain in our room until advised otherwise. *Fire alarm:* calmly evacuate building, meet in courtyard near library stairs, notify me or emergency command personnel of any missing individuals. *Active shooter*: Run/Escape, Hide, Fight. If trapped hide, lock doors, turn off lights, spread out and remain quiet. Follow instructions of emergency responders. Additional details and information: www.uwsp.edu/rmgt

Health situations including COVID-19: The health and safety of our students, faculty and staff are top priorities. Please monitor your health, including your mental health. If you are not feeling well or may be contagious, please do not come to class, instead rest up and if needed reach out to the appropriate medical personnel.

As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.

All students, faculty and staff will follow the UWSP policies and guidelines pertaining to the COVID-19. See: https://www.uwsp.edu/coronavirus/Pages/default.aspx, or email covid@uwsp.edu.

Lecture & Lab Schedule

TENTATIVE lecture & lab schedule. I will consult the class regarding any major changes and please watch Canvas for changes & due dates.

Week	Monday	Wednesday	Friday	Tuesday-Lab
5-Sep	*Semester not started yet*	S. Designs, Math & Stats	Math & Stats	Intro & Sampling Designs
12-Sep	Math & Stats	Math & Stats, Selectivity	Selectivity	Basic Stats
19-Sep	Catchability	Catchability	Power Analysis	Selectivity & Catchability
26-Sep	*Papers & Review*	Size Structure	Size St. & Body Condition	**Exam 1**
3-Oct	Body Condition	Age & Growth	Age & Growth	Size & Condition
10-Oct	Fecundity & Maturity	Fecundity & Maturity	Abundance	Maturity & Growth
17-Oct	Abundance	Abundance	Community Metrics	Abundance 1
24-Oct	*Papers & Review*	Abundance	Abundance	**Exam 2**
31-Oct	Exponential Growth	Exponential Growth	Logistic Growth	Abundance 2
7-Nov	Logistic Growth	Mortality	Mortality	Population Growth
14-Nov	Mortality	Movement & Migrations	Movement & Migrations	Mortality
21-Nov	*Papers & Review*	Recruitment (recording)	*No Class - Thanksgiving*	**Exam 3**
28-Nov	Recruitment	Surplus Production	Surplus Production	Recruitment
5-Dec	Yield Per Recruit	Yield Per Recruit	Dynamic Pool YPR	Surplus Production
12-Dec	Fisheries Management	Manage., Papers, Review	*No Class - Finals*	YPR, Dynamic Pool
19-Dec	---------------------------- **Exam 4, Wednesday, December 21, 2:45-4:45** ----------------------------			

- Original, 8.30.2022

WATR 353/553 – Fish Population Dynamics

Lecture, Reading, & Assignment Schedule

TENTATIVE topic, reading, and assignment schedule that may change during the semester. Please watch Canvas for changes & due dates. Note: *=Tuesday, ^ = Sunday.

Date	Topic	Reading	Assignment
5-Sep	*Semester not started yet*		
7-Sep	S. Designs, Math & Stats	Chapter 3, esp. bolded title sections	Class & Entry Surveys
9-Sep	Math & Stats	Chapter 1, especially 1.1 - 1.4.1.2	
12-Sep	Math & Stats	Chapter 1, especially 1.1 - 1.4.1.2	Intro Lab*
14-Sep	Math & Stats, Selectivity	Chapter 1, especially 1.1 - 1.4.1.2	
16-Sep	Selectivity	7.1-7.3.5 and 9.3	
19-Sep	Catchability	7.1-7.3.5 and 9.3	Post Paper 1, Basic Stats Lab*
21-Sep	Catchability	7.1-7.3.5 and 9.3	
23-Sep	Power Analysis	1.4.1.2- 1.4.1.3	Comment Paper 1^, Sel. & Catch. Lab^
26-Sep	*Papers & Review*		Discuss Paper 1, Exam 1*
28-Sep	Size Structure	Chapter 9, esp. 9.1, 9.2, 9.5, 9.6	
30-Sep	Size St. & Body Condition	Chapter 10	
3-Oct	Body Condition	Chapter 10	
5-Oct	Age & Growth	Chapter 5	
7-Oct	Age & Growth	Chapter 5	
10-Oct	Fecundity & Maturity		Size & Body Lab*
12-Oct	Fecundity & Maturity		
14-Oct	Abundance	Review 7.1-7.3.5	
17-Oct	Abundance	8.1-8.4, Pine et al. 2003	Post Paper 2, Maturity & Growth Lab*
19-Oct	Abundance	8.1-8.4, Pine et al. 2003	
21-Oct	Community Metrics	Chapter 15	Comment Paper 2^, Abund. Lab^
24-Oct	*Papers & Review*		Discuss Paper 2, Exam 2*
26-Oct	Abundance	8.1-8.4, Pine et al. 2003	
28-Oct	Abundance	8.1-8.4, Pine et al. 2003	
31-Oct	Exponential Growth		
2-Nov	Exponential Growth		
4-Nov	Logistic Growth		
7-Nov	Logistic Growth		Abundance 2 Lab*
9-Nov	Mortality	Chapter 6	
11-Nov	Mortality	Chapter 6	
14-Nov	Mortality	Chapter 6	Post Paper 3, Pop. Growth Lab*
16-Nov	Movement & Migrations	Chapter 14	
18-Nov	Movement & Migrations	Chapter 14	Comment Paper 3^, Mortality Lab^
21-Nov	*Papers & Review*		Discuss Paper 3, Exam 3*
23-Nov	Recruitment (recording)	Chapter 4 and 13.2.3.3	
25-Nov	*No Class - Thanksgiving*		
28-Nov	Recruitment	Chapter 4 and 13.2.3.3	
30-Nov	Surplus Production	8.5 and 13.2.3.1	
2-Dec	Surplus Production	8.5 and 13.2.3.1	
5-Dec	Yield Per Recruit	13.2.3.2	Recruitment Lab*
7-Dec	Yield Per Recruit	13.2.3.2	Post Paper 4
9-Dec	Dynamic Pool YPR	13.2.3.2	
12-Dec	Fisheries Management	13.2.3.2	Comment Paper 4, Sur. Prod. Lab*
14-Dec	Manage., Papers, Review		Discuss Paper 4, YPR Lab, Surveys
16-Dec	*No Class - Finals*		
21-Dec	**Exam 4, Wednesday, 2:45-4:45**		Exam 4