

QSCI 480
Sampling Theory for Biologists
Winter Quarter 2015

- Instructor: John R. Skalski
Campus office – 208A Fishery Sciences Building
Downtown office – 1325 Fourth Avenue, Suite 1515,
Seattle
Phone (206) 616-4851
- Course: Three credits
- Lectures: Tuesdays and Thursdays, 11:30 a.m. – 12:50 p.m.
Room 213, Fishery Sciences Building
- Prerequisites: QSCI 381 and 482, or equivalent courses
- Textbook: Cochran, W. G. 1977. *Sampling techniques*. Wiley & Sons.
Lecture notes. The Ave Copy Center, 4141 University Way NE
Supplemental: Thompson, S. K. 1992. *Sampling*. Wiley & Sons.
- Requirements:
- | | |
|------------------------------------|------------|
| Nine 50-point homework assignments | 450 |
| Final course project | <u>150</u> |
| Total | 600 |

No late assignments accepted without prior approval.

Grading:	<u>Score</u>	<u>Grade</u>
	90% - above	3.5 – 4.0
	80% - 90%	2.5 – 3.4
	70% - 80%	1.5 – 2.4

Disability Accommodations: To request academic accommodations due to a disability, contact: [Disability Resources for Students](#), 448 Schmitz, 206-543-8924 (V/TTY). If you have a letter from that office indicating that you have a disability which requires academic accommodations, present the letter to the instructor so that we can discuss the accommodations needed for the class.

Academic Conduct: Plagiarism, cheating, and other misconduct are serious violations of the student conduct code. We expect that you will know and follow the UW's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to UW regulations. More information, including definitions and examples, can be found in the Faculty Resource for Grading and the Student Conduct Code (WAC 478-120).

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Sampling Theory for Biologists
Course Outline – Winter Quarter 2015

Week 1
(5 – 9 Jan.)

I. Basic Sampling Concepts

Lecture #1: What is sampling?

- Example of all possible samples
- Measurement error vs. sampling error
- Definitions and parameters
- Drawing a random sample

Lecture #2: Simple random sampling (SRS)

- Estimating population means and totals
 - Estimating proportions and ratios
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Week 2
(12 – 16 Jan.)

Lecture #3: Sample size calculations for SRS

- Confidence interval estimation
- Defining sampling precision

Lecture #4: Stratified random sampling (STRS)

- Estimating population means and totals
 - Post-stratification
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Week 3
(19 – 23 Jan.)
19 Jan. – Holiday

Lecture #5: Sample size calculations for STRS

- Example of spatial-temporal STRS
- Optimal allocations

Lecture #6: Systematic sampling

- Estimating population means and totals
 - Advantages and disadvantages
 - Comparison to other sampling schemes
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II. More Advanced Sampling Designs

Week 4
(26 – 30 Jan.)

Lecture #7: Cluster sampling for equal size clusters

- SRS of primary units
- SRS of primary and secondary units

Lecture #8: Cluster sampling for unequal size clusters

- SRS of primary units
 - Sampling with probabilities proportional to cluster size
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Week 5
(2 – 6 Feb.)

Lecture #9: Multi-stage (three-level) sampling

- Applications in nature
- Optimal allocation

Lecture #10: Ratio and regression estimators

- Estimating population means and totals

Week 6
(9 – 13 Feb.)

Lecture #11: Double sampling to estimate means and totals

- Double sampling for stratification

Lecture #12: Ranked-set sampling

- Using priors to improve precision

III. Specialized Topics

Week 7
(16 – 20 Feb.)
16 Feb. - Holiday

Lecture #13: Sampling with model-based errors

- Example: Regional abundance
- Example: Season-wide smolt survival

Lecture #14: Line-intercept sampling

- Example: Estimating timber windfall

Week 8
(23 – 27 Feb.)

Lecture #15: Line-transect sampling

- Flush count surveys – radial distance methods

Lecture #16: Line-transect sampling

- Right-angle distance methods
- Designing line-transect surveys

Week 9
(2 – 6 Mar.)

Lecture #17: Compositing samples for analysis

- Design and analysis of compositing schemes

Lecture #18: Sampling for time trends

- Rotational sampling
- Bellwether sampling
- Panel designs

Week 10
(8 – 12 Mar.)

Lecture #19: Adaptive sampling

- Variations on adaptive cluster sampling
- Simple adaptive cluster sampling

Lecture #20: Summary of sampling principles

Final project due on the last day of class, 12 March 2015.
