



## Principles of Scientific Sampling for Environmental Professionals - Study Design, Data Reporting and the Appropriate Use of Statistics to Support Conclusions.

Course I.D. STAT-403  
January 29 - 31, 2008, 8:30 A.M. to 5:00 P.M. (3 Days)  
William A. Egan Civic & Convention Center - *Board Room*  
555 West 5th Avenue  
Anchorage, Alaska

**Instructor:** Dr. Harold J. Geiger

**Description:** This course provides an overview that will cover the basic terms, concepts, and logic that underlie modern scientific sampling. Much of the class will be devoted to the understanding of how to apply the basic concepts of probability to sampling problems and how to use probability to measure the effectiveness of the sampling process. We will compare the difference between purposive and random sampling and discuss why random sampling (and its many variations) is so frequently used in manufacturing, science, and government. This class will emphasize written communication, in the style of a scientific report, as an essential part of the scientific sampling process. The course is intended for environmental professionals with a limited statistical background that must use scientific sampling to describe natural phenomena or who must use sampling to make management recommendations. *\*This course differs from STAT-402 in that it includes a third day with greater emphasis on data reporting and the appropriate use of statistics to support study conclusions.*

**About the Instructor:** Dr. Geiger is a biologist and biometrician who has worked in Pacific salmon stock assessment in Alaska for the last 24 years. He has published on topics ranging from sampling, to population genetics, to the effects of the *Exxon Valdez* oil spill on pink salmon. His emphasis in teaching statistics is on how to use quantitative results in scientific communications, rather than on statistical formulae or calculations. Dr. Geiger has served two terms as the president of the Alaska chapter of the American Statistical Association and served as president of the Alaska Chapter of the American Fisheries Society in 2005.

### Course Topics:

#### Terms, concepts, and background:

- Statistical population, sampling units, population parameters, statistics, samples
- Mathematical notation and equations
- Measures of central tendency and measures of variation in a population

#### Three sampling approaches

- Purposive sampling
- Simple random sampling
- Systematic sampling

#### Some probability distributions

- Discrete distributions (Binomial and Poisson)
- Normal distribution and why many things approximately have this distribution

#### A simple mark-recapture study and spreadsheet simulations

- The Petersen estimate
- Parametric bootstrap methods
- The sampling distribution
- The effect of sample size
- Sampling and non-sampling errors
- Typical measures of sampling error

#### Stratified random sampling

- As a way to increase precision
- Sampling domains

#### Written summaries of sampling studies

- Methods, results, discussion, and abstracts
- The use of equations in reports
- Correct use of terms like bias, stratification, or parameter
- Inferring population characteristics from a sample
- Using statistical results to support conclusions
- Generating wisdom rather than just more numbers

**After completing this course, participants will be able to** understand, discuss, and recommend basic sampling approaches using the standard terminology of modern statistics. The student will have a basic understanding of how to use probability and simulation to study precision in sampling-based estimates. Moreover, the student should be able to help develop written summaries of sampling studies and to defend these studies using the logic of scientific sampling.

**Prerequisites:** A working knowledge of Microsoft Excel. Previous statistics or probability training/experience is helpful, but not required.

**Education Level:** Introductory/intermediate. The course is not recommended for professionals with extensive experience designing scientific sampling projects, unless a majority of course topics listed above are not well understood.

**Course Materials:** Each participant will receive a copy of the course proceedings including notes and reference material.

**Continuing Education Units:** 2.0

**What to Bring:** A laptop computer with Microsoft Excel, writing tools (pens or pencils), coffee mug and water bottle (to reduce waste). Please wear comfortable clothing appropriate for the prevailing weather.

**Registration:** \$595 (\*\$495 reduced tuition available for Native American tribes; government employees; nonprofits; students; and NAEP, NEBC, NWAEP members). You may register via the link below or by calling the Northwest Environmental Training Center at 206-762-1976.

**Cancellation Policy:** *Registration fees are fully refundable up to 30 days prior to the event and 50 percent refundable (or 100 percent credit) thereafter up to the day prior to the event. Registration may occur up to the day prior to the event provided that space is available.*

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**Northwest Environmental Training Center**

A nonprofit 501(c)(3) program of the Northwest Environmental Education Council  
650 S. Orcas Street, Suite 220 | Seattle, Washington 98108  
Phone: (206)762-1976 | Fax: (206)762-1979  
[www.nwetc.org](http://www.nwetc.org)



Anchorage  
Alaska

### Directions to William A. Egan Civic & Convention Center

555 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 263-2800  
[www.EganCenter.com](http://www.EganCenter.com)

For more info about Anchorage, Alaska please visit [www.anchorage.net](http://www.anchorage.net)  
{Accommodations}

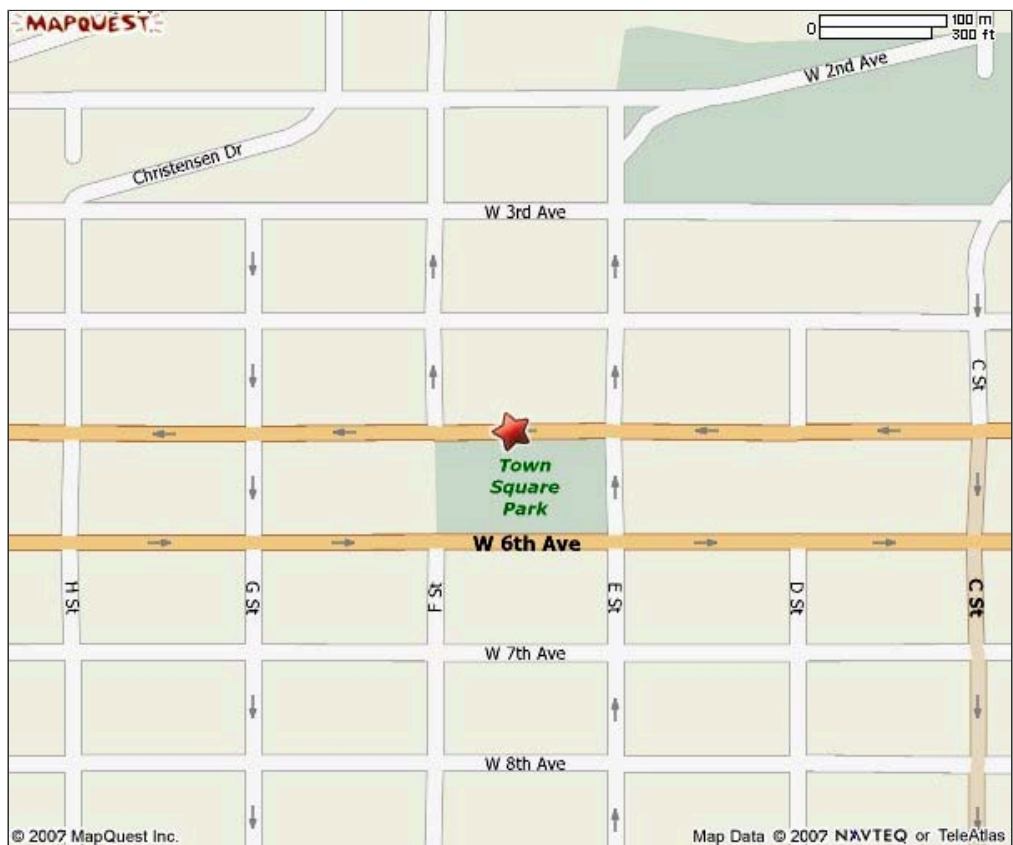
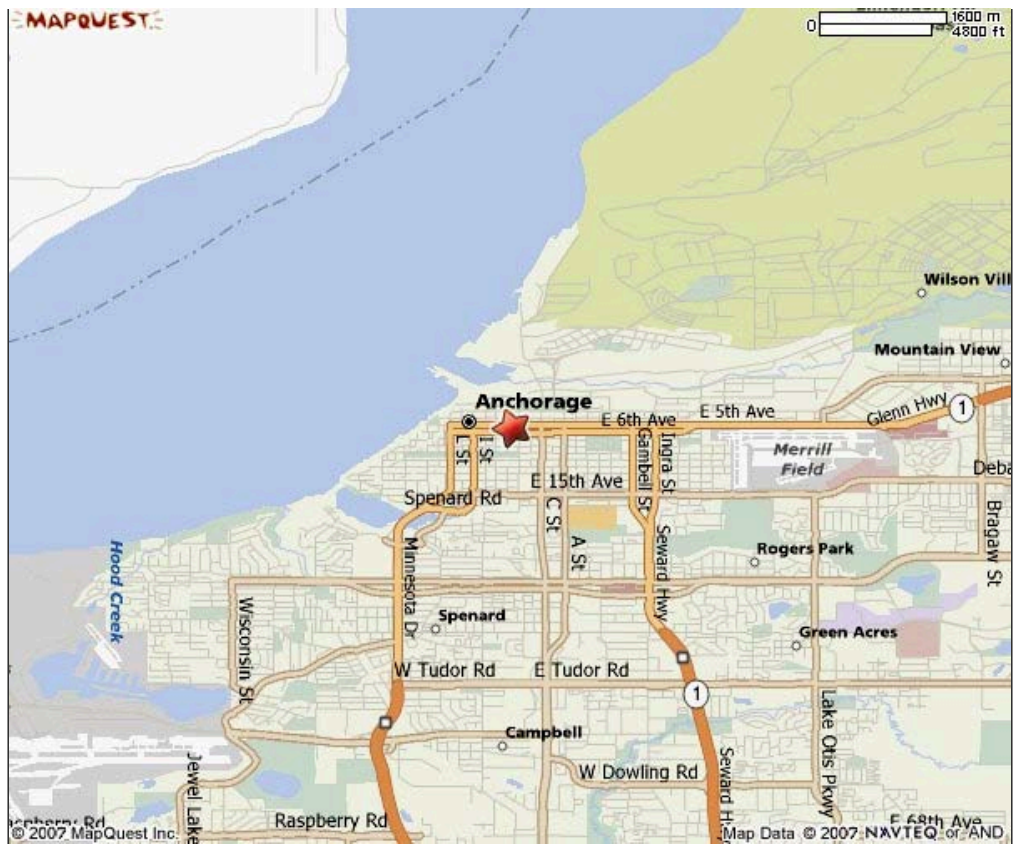
### Transportation

The following services will get you around Anchorage if you do not wish to drive yourself:

<b>People Mover Bus</b> 3650 E Tudor Road 907 343-6543	<b>Anchorage Yellow Cab Inc.</b> 907 272-2422	<b>Alamo</b> 907-248-0017 Avis 907-249-8260	<b>Budget</b> 907-243-6492 or 907-243-0150
<b>Anchorage Checker Cab</b> 907 274-3333	<b>AAA Metro Cab</b> 907 677-7000	<b>Dollar Rent A Car</b> 907-248-5338	<b>Thrifty</b> 907-276-2855

### Maps:





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## Accommodations near the William A. Egan Civic & Convention Center

555 West Fifth Avenue  
Anchorage, Alaska 99501  
(907) 263-2800  
[www.EganCenter.com](http://www.EganCenter.com)

For more hotels in Anchorage, Alaska please visit [www.anchorage.net](http://www.anchorage.net)

<u>Historic Anchorage Hotel</u> 330 E Street 1-800-544-0988 Anchorage, AK	907-272-4553	<u>Anchorage Hotel</u> 330 E Street Anchorage, AK 1-800-544-0988	907-272-4553
<u>Anchorage Hilton</u> 500 3rd Avenue Anchorage, AK 1-800-HILTONS	907-272-7411	<u>Sheraton Anchorage</u> 401 E 6th Avenue Anchorage, AK 1-800-478-8700	907-276-8700
<u>Day's Inn – Anchorage</u> 321 E 5th Avenue Anchorage, AK 1-800-DAYS-INN	907-276-7226	<u>Westmark Hotel</u> 720 W 5th Avenue Anchorage, AK 1-800-544-0970	907-276-2198

To find out more about NWETC's programs send us [email](#).

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NORTHWEST ENVIRONMENTAL TRAINING CENTER

650 S. Orcas Street, Suite 220, Seattle, WA 98108

Ph: (206)762-1976, Fax: (206)762-1979

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## REGISTRATION FORM

Name: \_\_\_\_\_ Today's Date: \_\_\_\_\_

Agency/Organization: \_\_\_\_\_

Street Address: \_\_\_\_\_ Mail Code: \_\_\_\_\_

Street Address (cont.): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_ Title: \_\_\_\_\_

### Indicate Course(s):

**Scientific Sampling: Study Design, Data Reporting and the Appropriate Use of Statistics to Support Study Conclusions.** \$ \_\_\_\_\_

*Course I.D. STAT-403 | January 29-31, 2008*

*Anchorage, AK*

**Registration: \$595 (\$495\*)**

\*Reduced rates for Native American tribes; nonprofits; government employees; students; and NEBC, NAEP, NWAEP members.

Payment Method: Check  PO  Credit Card (Visa or Mastercard)  Total: \$ \_\_\_\_\_

Credit Card or PO #: \_\_\_\_\_ Exp: \_\_\_\_\_

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