

## Statistical Experimental Design Course Registration

Return by Jan 8, 2010

TO: Institute of Barley and Malt Sciences

Department of Plant Sciences

NDSU 7670, PO Box 6050

Fargo, ND 58108-6050

For room reservations contact the Ramada Plaza Suites and Convention Center (1635 42nd St. S, Fargo, ND 58103, phone: 701-277-9000) by Dec. 19, 2009. Web address: ramadafargo.com

Questions contact:

Karen Hertsgaard 701-231-5384, 701-793-1146 or

Karen.Hertsgaard@ndsu.edu

Name

Mailing Address

Company

Telephone

E-mail

Course Registration Fee \$480

Total (Make checks payable to  
**NDSU—Plant Sciences**)



**NDSU**  
North Dakota State University  
**ND Agricultural  
Experiment Station**

### IBMS

Providing reliable, high-quality, targeted research and education for U.S. barley producers and domestic and international malting and brewing industries at a single site. The IBMS Board is comprised of individuals from the malting and brewing industries, commodity groups and NDSU. The IBMS is part of the NDSU Agricultural Experiment Station (NDAES).

Director: Dr. Paul Schwarz  
701-231-7732

Paul.Schwarz@ndsu.edu

website address: ag.ndsu.edu/ibms/



### Barley CAP

The Barley Coordinated Agricultural Project (CAP) is a community effort of 30 scientists from 19 institutions focused on identifying molecular markers that will dramatically speed up breeding efforts to improve barley for food, feed and brewing. Funding is from the USDA-NRI-CSREES  
website address: barleycap.org



### NCI

Northern Crops Institute (NCI) is the international center for meeting and learning about northern grown crops produced in the four-state region of North Dakota, South Dakota, Minnesota and Montana. Situated on the campus of North Dakota State University, NCI exists as a forum to bring together customers, commodity traders, technical experts, processors and producers from all points of the globe for discussion, education, and technical service programs. Since 1983, the Institute has hosted visitors from over 127 countries.  
website address: northern-crops.com

NDSU is an equal opportunity institution. This publication will be made available in alternative format upon request to people with disabilities (701) 231-7881

# Introduction to Statistical Experimental Design

*A Short Course*

*Jan. 19-22, 2010*

*Northern Crops Institute  
Bolley Drive, North Dakota  
State University, Fargo, ND*

### Sponsors

*Institute of Barley and Malt Sciences (IBMS)  
Barley Coordinated Agricultural Project (CAP)  
Northern Crops Institute (NCI)  
NDSU Agricultural Experiment Station (NDAES)*



# INTRODUCTION TO STATISTICAL EXPERIMENTAL DESIGN: A Short Course

## WHO SHOULD ATTEND

The introductory statistical experimental design short course is intended for individuals conducting research on agricultural products in the field or laboratory and field agronomists. Background needed for the course is knowledge of basic math.

## INSTRUCTOR

The Statistical Experimental Design Course will be taught by Dr. Rich Horsley. Dr. Horsley is a Professor and barley breeder in the Department of Plant Sciences, NDSU. He joined the faculty in 1988. Dr. Horsley received a B.S. in Agronomy from the University of Minnesota, an M.S. in Agronomy from NDSU, and a Ph.D. in Crop and Weed Sciences from NDSU. Dr. Horsley has taught a graduate level course in experimental design yearly since 1987.

## REGISTRATION

Registration for the course is \$480. This includes course materials, lunches and transportation between the hotel and NDSU Campus. Registration is due by Jan. 8, 2010. For questions contact:

Karen Hertsgaard at 701-231-5384 or 701-793-1146  
Karen.Hertsgaard@ndsu.edu

## LOCATION & LODGING

The course will be held at the Northern Crops Institute on the NDSU Campus in Fargo. Classes will begin at 8:30 AM Tues. Jan. 19 and end at 12:00 noon on Fri. Jan. 22. A block of hotel rooms are being held at the Ramada Plaza Suites and Convention Center (1635 42nd St. S, Fargo, ND 58103, phone: 701-277-9000) at a rate of \$79 per night from Jan. 18 to 21. To reserve one of these rooms please call the hotel before Dec. 19, 2009.

## TOPIC OUTLINE

### STATISTICAL REVIEW

Types of variables  
Populations vs. Samples  
Measures of central tendency  
Measures of dispersion  
Variance of the mean and standard error  
Coefficient of variation

### PLANNING EXPERIMENTS

Types of experiments  
Items to consider in planning experiments  
Experimental units  
Replication  
Choice of design  
Randomization

### HYPOTHESIS TESTING

Type I error  
Type II error  
Power of the test  
Steps in testing hypotheses  
Testing the hypothesis that  $\mu$  is a specified value (*t*-test and confidence interval)

### COMPARISONS INVOLVING TWO SAMPLE MEANS

Sample means with equal variance (*t*-test, confidence interval, and *F*-test)  
Two sample means with unequal variance (*t*-test)

### COMPLETELY RANDOM DESIGN

ANOVA for any number of groups with equal replication  
ANOVA for any number of groups with unequal replication  
ANOVA with sampling  
Assumptions underlying ANOVA

### MEAN COMPARISON TESTS

Least Significant difference (LSD)  
Duncan's new multiple range test (DMRT)  
Linear contrasts

### RANDOMIZED COMPLETE BLOCK DESIGN

ANOVA for any number of treatments  
ANOVA with sampling  
ANOVA with missing data

### LATTICE DESIGN

Square lattice  
Rectangular lattice

### DIFFERENT ARRANGEMENTS USED IN

### EXPERIMENTAL DESIGNS

Factorial arrangements  
Split plot arrangements  
Split block arrangements  
Split-split plot arrangements

### COMBINED ANALYSIS OF EXPERIMENTS

Combined analysis of experiments across locations  
Combined analysis of experiments across years  
Combined analysis of experiments across time and space  
Intro to Proc mixed

### REGRESSION AND CORRELATION

Simple linear regression  
Simple correlation