Methodology in Agricultural and Food Sciences
ANSC 7500

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Marker: TBA

Note on smartphones

Please turn them off and put away during class time. If you must use them (even for "texting"), please go into the hall.

Course outline

Topic	# lectures
1. Principles of scientific experimentation and check list for design and analysis of experiments.	1
2. Populations, sampling, distributions, probability, notation, ttests, power of tests	6
3. Linear regression, analysis of variance, assumptions of ANOVA	3
4. Multiple regression, Type I and II SS	2
5. Experimental designs overview	1
6. The completely randomized design (CRD)	7
7. Factorial experiments	2
8. The nested design	2
9. Randomised complete block designs	3
10. Latin square designs	2
11. Split-plot designs	2
12. Repeated measures designs	3
(other: 2 midterms, one computer-lab class)	3

Students will gain expertise in the use of statistical analysis computer software (primarily SAS) on microcomputer Windows systems.
Computer session: Class time on Friday, Jan. 15 in Agric. 137.

Textbooks and reference material

Please obtain the following manual that will be used to learn the SAS system for analysis of data:

> Crow, G.H. 2012. Using SAS in Agricultural and Food Sciences Research. University of Manitoba. U. of M. bookstore in the Agriculture texts area (includes lecture notes). Price is $18.50.

For interest only:

> Crow, G.H. 2010. A little R book for AnSc7500. See the D2L page for this course.

Apart from the manual there is no required textbook for this course.

I recommend, however, that you get a good text to use as a general reference not only for this course but for your research work.

> Two good ones are Quinn and Keough (2002) and Steel et al. (1997). Out-of-print Steel et al. (1997) in bookstore for ~$20 – a good buy!!

Useful texts.

Box, G.E.P., Hunter, W.G. and Hunter, J.S. 2005. Statistics for experimenters. Design, innovation and discovery. John Wiley and Sons, Inc. New York.

Clewer, A.G. and D.H. Scarisbrick. 2001. Practical statistics and experimental design for plant and crop science. John Wiley and Sons, New York.

Cochran, W.G. and Cox, G.M. 1957. Experimental designs. John Wiley and Sons, Inc. New York.

Gill, J.L. 1980. Design and analysis of experiments in the animal and medical sciences. Volumes 1 and 2. The Iowa State University Press. Ames, Iowa.

Kaps, M. and W.R. Lamberson. 2004. Biostatistics for animal science. CAB International, Wallingford, Oxfordshire, UK.

Mead, R., Curnow, R.N. and Hasted, A.M. 1993. Statistical methods in agriculture and experimental biology. Second edition. Chapman and Hall.

Quinn, G.P. and Keough, M.J. 2002. Experimental design and data analysis for biologists. Cambridge University Press. New York.

Roberts, E.A. 1992. Sequential data in biological experiments. An introduction to research workers. Chapman and Hall, New York.

Snedecor, G.W. and Cochran, W.G. 1989. Statistical methods. The Iowa State University Press. Ames, Iowa.

Steel, R.G.D., J.H. Torrie and D.A. Dickey. 1997. Principles and procedures of statistics -- a biometric approach. Third edition. McGraw-Hill Publishing Company. Toronto.

See also SAS reference manuals.

For suggestions on data presentation and graphics.

Robbins, N.B. 2005. Creating more effective graphs. John Wiley and Sons, New York.

Tufte, E.R. 1983. The visual display of quantitative information. Graphics Press. Cheshire, Connecticut.

Useful web links

1 SAS® University Edition. This is free SAS software that you can use for most statistical analyses.

http://www.sas.com/en_us/software/university-edition.html

2. Computer Assisted Statistics Textbooks (CAST), can be downloaded to your PC or Mac, lots of excellent interactive visuals

http://cast.massey.ac.nz/collection_public.html

3. Link to SAS version 9.4 reference materials at sas.com (we use procedures described in Base SAS or in SAS/STAT)

http://support.sas.com/documentation/94/index.html

Assignments

Assignments will be given out at the last class of each week (usually Thursday) and will be due one week later.

Students are encouraged to work together on assignment problems. The assignment work that is passed in by each student, however, should be written up independently and be in each student's own words.

Access assignment material through your University of Manitoba D2L site for this course.

Student evaluation

Midterm exam 1, February 11*	15%
Midterm exam 2, March 10*	25%
Assignments	25%
Final exam	35%

* Both tests will be on Thursday, and will be held in the evening at **6:00 PM-7:30 PM** in **Room 219**, Animal Science.

Assessment of grades

You will get numeric scores for assignments and exams.

These scores will be weighted according to the above scheme to come up with a final numerical score.

This final score will be used to assign the letter grade which will appear on your transcript -- See section 4 of the General Academic Regulations of the University online calendar for a description of the letter grade system (2014-2015)

http://crscalprod1.cc.umanitoba.ca/Catalog/ViewCatalog.aspx

Final scores will be rounded -- 76.4 becomes 76, thus a B; 76.5 becomes 77, thus an B+.

Numerical score	Letter grade
91-100	A+
84-90	A
77-83	B+
70-76	B
65-69	C+
60-64	C
50-59	D
Under 50	F

Voluntary Withdrawal

The last day for voluntary withdrawal
without academic penalty is Mar. 18, 2015.

Assignments

For assignment work, I encourage you to work together on problems - the purpose of assignments is to understand the material.

You may also use the internet for background material.

The completed assignment work that you pass in to me must be in your own words.

If the internet, or other material is used in your work, this must be properly referenced.

Please refer to the University Calendar for statements on academic dishonesty including Plagiarism and Cheating. See section 8 of the General Academic Regulations of the University online calendar (2015-2016)

http://crscalprod1.cc.umanitoba.ca/Catalog/ViewCatalog.aspx

Examples of previous tests

Previous tests will be posted on the University of Manitoba UM Learn site for this course.