PhD 1504 - Quantitative Analysis II –

Instructor:  Prof. Sam Woolford, Morison Hall 376, extension 2086, email swoolford@bentley.edu.
Office Hours: Monday 4-5:30pm, Wednesday 3-4:30pm or by appointment.

Textbooks:

Software:
A standard statistical package such as SPSS (Statistical Package for the Social Sciences) or SAS (Statistical Analysis System) will be required and used throughout the course. Personal versions of will be available at the Library. Other specialized software such as AMOS will be used for specific topics.

Overview:
This is the second course of a two-course sequence in statistical methods and will focus on multivariate statistical methods. Building on the material from Quantitative Analysis I, the course will study some of the most commonly used multivariate techniques. The course begins by extending the ANOVA model to ANCOVA and then to the multivariate equivalents MANOVA and MANCOVA. Then classical forms of cluster analysis, principal components and exploratory factor analysis follow. Confirmatory factor analysis will then be covered and the rest of the course will be devoted to the study of structural equations models.

Learning objectives:
Knowledge:

For each of the methodologies discussed, we expect that students will be able to:
- Get a general understanding of how each method works
- Recognize why the method is appropriate to a particular research environment
- Understand how to perform the analysis using appropriate software
- Be able to interpret the results in a research context.
Skills:
- Ability to present quantitative research results convincingly and with the ability to address reasonable criticisms of the methods used.
- The capacity to critically read published research articles which make use of the techniques covered.
- Facility with a statistical software package in a research context
- Ability to appropriately develop a written research description of a statistical analysis
- Understanding general statistical principles well enough to enable learning additional techniques beyond those covered.

Perspectives:
- An appreciation for the nature of variability and the role of statistical methods in determining relationships between factors and quantifying the amount of inherently random variation in a problem.
- A respect for the power of quantitative research as well as an understanding of the appropriate inferences that can be drawn from particular methods.

Course Evaluation
The course grade will be determined primarily on the basis of between 6-8 assignments (85%) and on the basis of the quality of participation to classroom discussion (15%). The assignments will consist of actual analyses performed on the computer and presented in the form of a report. Class discussion will be critical to developing a broader and deeper understanding of the material and quantitative business research in particular and will include discussion of readings of research articles which demonstrate that participants understand the use of the covered techniques in published work. Class discussion is what will make the course applicable as real life statistical applications are not always as straightforward as they may appear.

Tentative weekly outline (with readings)

Weeks 1, 2, 3: Review ANOVA and extend to ANCOVA, MANOVA and MANCOVA (Hair et al, chapter 1 and chapter 7)

    Research articles such as:
    The development and transferability of task knowledge, by Jay Thibodeau, Auditing, 2003.

Weeks 4, 5, 6: Hierarchical and non-hierarchical cluster analysis (Hair et al, chapter 9)

    Research articles such as:
Defining the category of “small” states, by Crowards, Journal of international development, 2002

**Week 7, 8, 9:** Principal components analysis and exploratory factor analysis (Hair et al, chapter 3)

Internet resources: [http://www2.chass.ncsu.edu/garson/pa765/factor.htm](http://www2.chass.ncsu.edu/garson/pa765/factor.htm)

Research articles such as:

**Week 10:** Confirmatory factor analysis and introduction to AMOS (Hair et al, chapter 12 and chapter 13)

**Weeks 11, 12, 13, 14:** Structural equation modeling and partial least squares (Hair et al, chapters 14 and chapter 15)

Research articles such as:
*Developing and validating an observational learning model of computer software training and skill acquisition*, by Yi and David, Information systems research, 2003

*Issues and opinion on structural equation modeling*, by Chin, MIS Quarterly, 1998

*Polychronic tendency analysis: a new approach to understanding women's shopping behaviors*, by Lindquist, and Kaufman-Scarborough, Journal of consumer marketing, 2004


**Week 15:** Data triangulation from the quantitative point of view; triangulation of qualitative and quantitative data analysis

Research articles:
*Combining quantitative and qualitative methodologies in logistics research*, by Mangan, Lalwani and Gardner, International journal of physical distribution and logistics management.

**Academic Integrity**

The Bentley College Honor Code formally recognizes the responsibility of students to act in an ethical manner. The written homework in this course is meant to be an individual exercise. Students will, naturally and appropriately, talk about the problems (this is encouraged) but the final write up **must be a students own work in its entirety**. This includes all calculations. If two students submit homework problems that have identical and highly unlikely calculation errors, this is evidence that the students did not work on the problem themselves. **If you ever have a question regarding whether your level of collaboration is appropriate, ask Prof. Woolford!** Establishing a solid ethical foundation is an important part of your Bentley education and will enhance the value of your degree.