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## 18. Statistics

University of Central Oklahoma

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## **Abstracts from the 2013 Oklahoma Research Day**

### **Held at the University of Central Oklahoma**

#### **05. Mathematics and Science**

#### **18. Statistics**

##### **05.18.01 A Statistical Analysis of the “Fairness” of the NCAA Basketball Tournaments**

**Minzhe Wu, Tracy Morris,**

*University of Central Oklahoma*

The “fairness” of tournament designs is of crucial importance in competitive sports. For example, in a previous paper, Morris and Bokhari (2012) showed that in certain situations it is more advantageous to be seeded 10, 11, or 12 than 8 or 9. The objective of this research was to examine the “fairness” (meaning higher-ranked teams should perform better, on average, than lower-ranked teams) of the NCAA basketball tournaments relative to other tournament variations, such as reseeding and round robin designs. Data was collected from mcubed.net (<http://mcubed.net/ncaab>) concerning seed and game outcome (win or loss) for both the men’s and women’s tournaments dating back to the beginning of each tournament (1939 for the men’s and 1982 for the women’s). This data was used to develop a model for estimating the probabilities of any given seed beating any other seed. These estimated probabilities were then used to simulate the outcomes of other tournament designs.

##### **05.18.02 Project SCHOLAR: A Student Research Program Involving Service Learning**

**Candace Baker, Brenden Balch, Cynthia Murray, Kyle Williams, Tracy Morris,**

*University of Central Oklahoma*

Project SCHOLAR consists of a team of faculty and students from various departments in the College of Mathematics and Science. Our objectives are (1) to promote student interest in statistical research through active learning and (2) to provide statistical consulting services to other faculty members and the community at large. Students involved in Project SCHOLAR have an opportunity to work collaboratively with professors and specialists from different areas of research during each project. They work as a team to analyze submitted data using various statistical methods and software under the direction of statistics professors. They also prepare professional written and oral presentations for the researcher that submitted the project. Currently, Project SCHOLAR students are working on five different projects: an assessment of UCO’s developmental math program, an analysis of experimental data concerning the effects of peer mentoring on nurse anesthetist students at Newman University in Wichita, KS, a study of the enrollment trends at UCO, the development of a model to estimate the probability that a given UCO nursing student will complete the program, and an analysis of traffic fatality trends for the Oklahoma Highway Safety Office.

### **05.18.03 Alleviating Stress in Nursing Students through Peer Mentoring**

**Brian Gatewood, Alvin Teh, Beth Cochran, Cynthia Murray, Tracy Morris,**

*University of Central Oklahoma*

Project SCHOLAR (Statistical Consulting Help for Organizational Leaders and Academic Researchers) is a student statistical consulting service at the University of Central Oklahoma. SCHOLAR students work under the supervision of faculty from the department of mathematics and statistics on various projects submitted from other researchers from both on and off campus. In 2012, SCHOLAR students were approached by a group of students from Newman University in Wichita, KS to analyze some experimental data concerning the effects of peer mentoring on the stress levels of nurse anesthetist students. A group of nurse anesthetist students were given a survey concerning stress. Following the survey, half of the students participated in a peer mentoring program (experimental group) and half did not (control group). After the peer mentoring program the students repeated the survey concerning stress. The mean scores on six of the twenty items for the experimental group decreased significantly more than the mean scores on the same items for the control group. This indicates that the peer mentoring program may be effective at reducing the stress levels of nurse anesthetist students at Newman University.

### **05.18.04 A Logistic Regression Model for Predicting the Success of Nursing Students at UCO**

**Brian Gatewood, Cynthia Murray, Sarah Schatz, Tracy Morris,**

*University of Central Oklahoma*

The nursing program at the University of Central Oklahoma (UCO) has an abundance of students applying for limited slots of enrollment. When the selection process is competitive, it becomes beneficial to both the students and the nursing program to identify those students most likely to complete the program. Members of the Nursing Department conducted a study on enrolled nursing students in an attempt to discover the most important factors for predicting a student's likelihood of completing the nursing program. The studied variables included TEAS scores and GPAs. The students were tracked for four years and were grouped according to whether or not they finished the nursing program. Using logistic regression we were able to construct a formula to predict the probability of a student completing the program based on these variables. This work was completed by Project SCHOLAR (Statistical Consulting Help for Organizational Leaders and Academic Researchers) students. SCHOLAR is an interdisciplinary student statistical consulting service at UCO. SCHOLAR students work collaboratively under the supervision of faculty from the Department of Mathematics and Statistics on various projects submitted from other researchers on campus and organizations in the community.

## **05.18.05 Going For It...What Factors Contribute to a Fourth Down Conversion?**

**Yuting Wang, Tracy Morris,**

*University of Central Oklahoma*

It's fourth down and two yards to go. The ball is on your own 40 yard line. Do you go for the first down or punt? Coaches have to consider so many factors when making this decision, and must do so in a matter of seconds. Consequently, coaches tend to make the conservative decision to punt. In this research, data was collected from [www.cfbstats.com](http://www.cfbstats.com) concerning all fourth downs during the 2011 college football season. Only fourth downs for which the ball was either passed or rushed were included in the data set. Logistic regression was used to construct a model for estimating the probability of converting a fourth down based on a variety of variables including yards to go, score, home or away, and quarter.