Sam Houston State University

A Member of The Texas State University System

COLLEGE OF CRIMINAL JUSTICE
DEPARTMENT OF FORENSIC SCIENCE

FORS 6094
Forensic Statistics and Evidence Interpretation

Spring 2018

Professor: Patrick Buzzini, PhD

Telephone: 936-294-3633

Class hours: Tues 12:00-1:20

                 Thus 12:00-1:20

Office Hours: Tues & Thus 1:30-3:00

Office: 221-G

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Classroom: CFS 104

Suggested textbooks

Curran J. Introduction to Data Analysis with R for Forensic Scientists. CRC Press, Taylor & Francis Group, Boca Raton, FL (2010).

Course description

This course covers the application of various statistical methods to forensic science problems. During this course the difference between the frequentist and Bayesian approaches will be emphasized. While the former approach is more apt for data analysis in a research setting, this class will consider that the latter approach is instead more useful to address problems of scientific evidence interpretation. Students will be exposed to examples pertaining to trace evidence, impression evidence, toxicology, chemical data, and DNA evidence. Students will apply basic statistical methods using both MS Excel Analysis Toolpack and R software.

Course objectives

After successful completion of this course you will:
1. Clearly understand the difference between the so-called frequentist and Bayesian approaches;
2. Clearly understand the difference between data analysis and evidence interpretation;
3. Be able to properly perform basic statistical analysis from forensic data;
4. Properly learn the principles of evidence interpretation.

Course Schedule

Week	Date	Topic	Activity
1	Thu Jan 18	Variables (L) Probability definitions and properties (L)	• The "Monty Hall" (E)
2	Tue Jan 23	*No class - IPTES conference*	• Introduction to uncertainty, statistics and probability (RA1)
	Thu Jan 25	*No class - IPTES conference*	
3	Tue Jan 30	Probability distributions for discrete variables • Binomial distribution • Poisson distribution	• Summary Stats and graphs (RA2)
	Thu Feb 1	Probability distributions for discrete variables • Hypergeometric distribution • Poisson distribution	L • Car color distribution with Poisson distribution (E)
4	Tue Feb 6	Probability distributions for continuous variables • Normal distribution • *t*-distribution	
	Thu Feb 8	Probability distributions for continuous variables • Normal distribution • *t*-distribution	• Glass RI distributions (E) • **Ass 1 - *Probability and distributions* distribution**
5	Tue Feb 13	Hypothesis testing and outliers	• Amount of DNA detection (E)
	Thu Feb 15	Hypothesis testing and outliers	• THC amount comparisons (E) • Outliers detection (E) • **Ass 1 - *Probability and distributions* due date** • **Ass 2 - *Welch test for glass comparisons* distribution**
6	Tue Feb 20	*No class – AAFS meeting*	
	Thu Feb 22	*No class – AAFS meeting*	
7	Tue Feb 27	p-values, and confidence intervals	L
	Thu Mar 1	p-values, and confidence intervals	L
8	Tue Mar 6	Errors	L
	Thu Mar 8	Simple linear regression and correlation	• Postmortem Interval Estimation study (E) • **Ass 2 - *Welch test for glass comparisons* due date** • **Ass 3 – *Linear regression* distribution**
9	Tue Mar 13	*No class - Spring break*	
	Thu Mar 15	*No class - Spring break*	
10	Tue Mar 20	From frequentist to Bayesian statistics	L+E
	Thu Mar 22	**Written Test 1**	
11	Tue Mar 27	ANOVA	L
	Thu Mar 29	ANOVA	• Fingerprint chemical detection methods comparisons (E) • **Ass 3 – *Linear regression* due date**

			• **Ass 4 – *ANOVA* distribution**
12	Tue Apr 3	The Bayesian approach to evidence interpretation	• The Birmingham Six Case (E)
	Thu Apr 5	The Bayesian approach to evidence interpretation	L
13	Tue Apr 10	Likelihood ratio at the source level	L
	Thu Apr 12	Likelihood ratio at the activity level	L+E
14	Tue Apr 17	Introduction to Bayesian Networks	L+E • *Hugin Light* download
	Thu Apr 19	Introduction to Bayesian Networks	**Ass 4 – *ANOVA* due date**
15	Tue Apr 24	Practical examples of Bayesian Networks at the Source Level	E
	Thu Apr 26	Practical examples of Bayesian Networks at the Activity Level	E
16	Tue May 1	Practical examples of Bayesian Networks at the Crime Level	E
	Thu May 3	**Oral presentations**	
17	Tue May 8	**Written test 2 (1:00-3:00)**	

L: lecture; E: exercise or worked example; RA: reading assignment
Schedule may be subject to modification

Attendance policy

Attendance will be recorded in keeping with University policy. Students are expected to attend class. Class attendance requirements will be followed in accordance with Academic Policy Statement 800401. In accordance with university policy, students will not be penalized for absences of up to three hours as long as assigned work has not been missed. If a student is absent it is their responsibility to obtain the class material and remain current with information distributed during class. Occasionally changes in schedule may be announced in class. *These changes apply to all students, even those who were absent from class.* One letter grade may, at the discretion of the instructor, be deducted from students' final grade if they miss more than four classes. There will be no distinctions between "excused" and "unexcused" absences. Students are expected to be on time to class. After the beginning of the class, late students may be counted as absent.

Grading Policy

Final grades will be based upon the following scale: 90 plus average an "A"; 80 to 89 a "B"; 70 to 79 a "C". Appeals will be handled in accordance with University Policy Statement 900823, Academic Grievance Procedures for Students.

Assessment

Your final grade consists of the following grades:

Exercise assignments	40%
Oral presentation	20%
Written test 1	20%
Written test 2	20%

There are four exercise assignments. Assignments A1 to A5 each count 10% of your final grade. Four of them will count toward your grade for a total of 40% of your final grade. The four best scores will be considered for your final grade. Exercise assignments may include statistical exercises, use of R software, and theoretical questions. These are:

Topic	Due date
Assignment 1: Probability and distributions	Thu February 15
Assignment 2: Welch test for glass comparisons	Thu March 8
Assignment 3: Linear regression	Thu March 29
Assignment 4: ANOVA	Thu April 19

Assignments must be turned in to your instructor via email or in printed form by the end of the day (11:59 pm) on the due dates indicated above. Missing a deadline is awarded a grade of zero for that particular exercise.

There will be two written tests. They will cover all materials covered in class, including information from exercise assignments and reading assignments. Written Test 2 is not cumulative. They count 20% of your final grade each.

The oral presentation will be a mini research project assigned to you by your instructor. Your instructor will judge the *relevancy* of your assigned project with regards to your area of research, even if the topic may not necessarily be *in* your area of research. The oral presentation counts 20% of your final grade.

Make-up exams
There will be only one opportunity for make-up written exams. Such opportunity will be offered within a week of the date of the missed test. This opportunity will be given only in the event of a documented university-sponsored activity, or other unforeseen and unavoidable event. A written justification is required for such consideration. Missing this opportunity results in a grade of zero.

Student academic policies
Policies concerning Attendance, Academic Honesty, Disabled Student and Services for Disabled Students, and Absences on Religious Holy days may be found at: http://www.shsu.edu/dept/academic-affairs/aps/aps-students.html

Use of Cell & Smart Phones, PDA's & Similar Devices
Engaging in voice communication using a cell phone or similar communication device during class is prohibited. Device sound alerts should be turned off during class. Engaging in text communication during class is discouraged, although non-disruptive occasional use is permitted. Persistent or extended texting is, however, not allowed. Per University policy communication using any electronic device during an in-class examination is prohibited.

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