Course Announcement MATH 580: Statistical Theory, Spring 2022, time 10-10:50
MWF room Neckers 0156

This course will cover the theoretical background for statistical procedures in the location model. Topics will include

- minimal sufficient and complete statistics,

- maximum likelihood estimation,

- method of moments,

- information, the Cramer-Rao lower bound and uniformly minimum variance estimators,

- estimators that minimize the mean squared error,

- uniformly most powerful tests, and

- likelihood ratio tests

- Central limit theorem, delta method, MLE limiting distribution and convergence in distribution.

The text for this course is Olive, D.J. (2014), *Statistical Theory and Inference*, Springer NY. You can download a pdf file of the book from the library website (http://lib.siu.edu/). You can also use Olive, D.J. (2008), A Course in Statistical Theory. (http://parker.ad.siu.edu/Olive/infbook.htm).

To some extent, the course is the study of regular exponential families. Additional topics can be covered upon request. The prerequisites for this class are Math 483 or Math 480. You should be familiar with the normal, gamma, binomial, Poisson and exponential distributions, and there is a considerable amount of integration, differentiation, and optimization.

This type of course is taken by every student who is interested in obtaining a graduate degree in statistics. At SIU, Math 580 is one of the four courses from which Ph.D. students regularly take qualifying exams.

This course is also good for people who know that they are going to use statistical theory: for example, Econometrics, Psychology, Educational Psychology, and Electrical Engineers who are taking or plan to take ECE 551, ECE 552 and ECE 555. For actuaries, Math 580 is useful for CAS EXAM MAS-I part B (statistics).

For more information contact David Olive, 261 Neckers.
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Math 580, Section 001, Spring 2017. MWF, time 10-10:50, room Neckers 0156

Instructor: David Olive

Text: Olive, D.J. (2014), *Statistical Theory and Inference*, Springer, NY. The SIU library has the electronic version of this text.

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I am also available by appointment and on a walkin basis.

This course covers minimum sufficient and complete statistics, maximum likelihood estimation, method of moments, the Frechet-Cramer-Rao lower bound and uniformly minimum variance estimators, estimators that minimize the mean squared error, uniformly most powerful tests, likelihood ratio tests, confidence intervals, consistency, central limit theorem, convergence in distribution, and the delta method.

Final: time TBA date TBA (emphasis is on the above topics: ch.4 - $\oint$ 8.4).

The grading below is tentative. (Drop day in Friday, TBA with advisor, Sunday, TBA online.)

2 homeworks may be turned in one class period late (ie on Friday) with no penalty. A third late will be accepted with 25% penalty. 2 quizzes may be taken late before the next class period (ie on Monday). Two sheets of notes are allowed on quizzes but not on exams. A calculator is permitted.

Grading:

HW	300			Quizzes	100	
exam1	100	exam 2	100	exam 3	100	
final	300			total	1000	
min. grade	points	min. grade	points	min. grade	points	
A	900-1000	B	800-899	C	700-799	
D	550-699					

Week of	MON	WED	FRI
Jan 10	1.1-1.4, 1.5	1.5 1.6	1.6
Jan 17	no class	2.1, HW1	2.1, 2.2, Q1
Jan 24	2.2, 2.3	2.4 HW2	2.4, 2.5, Q2
Jan 31	2.5	2.6 HW3	2.6, Q3
Feb 7	2.7, 2.8	EXAM 1: $\oint$ 1.1-2.5	2.8, 2.9
Feb 14	2.9, 3.1	3.1, HW4	3.2, Q4
Feb 21	3.2, 4.1	4.1, HW5	4.2, Q5
Feb 28	4.2	4.2 HW 6	4.2, Q6
March 7	no class	no class	no class
March 14	4.2	5.1, HW7	5.1, Q7
March 21	5.2	Exam 2	5.2
March 28	5.2, 6.1	HW8	6.2, Q8
April 4	6.2,7.1	7.1, HW9	7.1, Q9
April 11	7.1, 7.2	7.2, HW10	7.2, Q10
April 18	7.2, 8.1	8.1	8.2, HW11
April 24	8.3,8.4, Q11	EXAM 3	rev