

# University of Houston-Clear Lake

MATH 3038 – 01 (Fall 2013) Syllabus

2:30 – 3:50pm (TR) @ Bayou 3315

## Quality Enhancement Plan (QEP) Applied Critical Thinking for Lifelong Learning and Adaptability



Instructor: Kevin Barlow

Office: Bayou 2325

Phone: 281-283-3065

Email: [barlowk@uhcl.edu](mailto:barlowk@uhcl.edu)

Office hour: TR 4:00 – 5:30pm or by appointment

Textbook: “Introductory Statistics, 8<sup>th</sup> Edition (ISBN: 978-0-470-90410-7)” by Prem S. Mann

Prerequisite: College Algebra or equivalent

Catalog Description: Descriptive statistics, basic probability concepts, normal distribution, parameter estimation, testing of hypotheses, correlation and regression, statistical computation using Excel.

Applied Critical Thinking Statement: This course has been authorized by UHCL as an Applied Critical Thinking (ACT) Course which means that in addition to learning about the specified course content, students will be engaged with some or all of the Elements of Thought and Universal Intellectual Standards of critical thinking. The objective of an ACT course is to develop the student’s ability to become skilled at analysis and evaluation by applying a set of intellectual tools that may be effectively used across all disciplines (as well as to the student’s personal life). Based on the Foundation for Critical Thinking (<http://www.criticalthinking.org/>) model, critical thinking involves thinking for a *purpose*, asking *questions*, using *information*, applying *concepts*, drawing *inferences and conclusions*, identifying *assumptions*, anticipating *implications and consequences*, and recognizing *points of view*. The Universal Intellectual Standards that are applied to these Elements of Thought of critical thinking in order to develop Intellectual Traits include *clarity*, *accuracy*, *precision*, *relevance*, *depth*, *breadth*, *logic*, *significance*, and *fairness*.

\*I reserve the right to modify this syllabus as necessary.

How Critical Thinking is Present in Statistics:

Statistics can be divided into 2 major areas: Descriptive Statistics and Inferential Statistics. These two areas are intermingled in to all aspects of our daily lives: presidential elections, TV advertisements, medical treatments to name just a few. In all of these examples, the student of statistics should be asking, “What are the *relevant assumptions* I need to identify about these data in order to draw *accurate inferences and conclusions*?”

Student Learning Outcomes: Upon completion of this course, students will be able to:

1. describe the difference between the *concepts* of a population and a sample with *clarity*,
2. organize and graph data (*information*) so that it is *logical* to the end-user,
3. calculate and apply the *concepts* of descriptive statistics with *accuracy*,
4. apply the basic *concepts* of probability with *accuracy*,
5. apply the basic *concepts* of the binomial probability distribution with *accuracy*,
6. understand the *relevance* of the *purpose* of determining the  $z$  and  $x$  values when an area under the normal distribution curve is known,
7. apply the basic *concepts* of sampling distributions with *accuracy*,
8. estimate the mean and proportion of a population using *assumptions* with *accuracy*,
9. conduct (and understand the *significance* of the *inferences and conclusions* of) hypothesis testing about the population mean and the population proportion, and
10. conduct (and understand the *significance* of the *inferences and conclusions* of) hypothesis testing about the difference between two population means and two population proportions.

Instructional Methodology: This course will mainly utilize PowerPoint lectures, combined with class discussion and problem solving sessions led by the instructor.

Attendance: Attendance is important to success in this course. Each student is responsible for all material covered and assignments due even when absent.

Honesty Code: Each student is expected to understand and abide by the UHCL Honesty Code; **I will be honest in all my academic activities and will not tolerate dishonesty.** See the catalog for a full description of the UHCL academic honesty policy.

Disability Policy: If you are certified as disabled and entitled to accommodation under the ADA, section 503, please notify the instructor as soon as possible. If you are not currently certified and believe you may qualify, please contact the UHCL Disability Services Office at 281-283-2648 or go to their website at <http://prtl.uhcl.edu/portal/page/portal/UAO/Student>.

***“The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance***

*with Section 504 and ADA guidelines, each University within the System strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact your University's student disability services center.” (SAM 01.D.09, p. 3)*

Syllabus Statement - 6 Drop Rule: 6 Drop Rule Limitation - Students who entered college for the first time in Fall 2007 or later should be aware of the course drop limitation imposed by the Texas Legislature. Dropping this or any other course between the first day of class and the census date for the semester/session does not affect your 6 drop rule count. **Dropping a course between the census date and the last day to drop a class for the semester/session will count as one of your 6 permitted drops.** You should take this into consideration before dropping this or any other course. Please visit [www.uhcl.edu/records](http://www.uhcl.edu/records) for more information on the 6 drop rule and the census date information for the semester/session.

Lectures: Student participation in class lectures is important to success in this course. Students should be prepared to ask and answer questions.

Vocabulary Quizzes (5%): At the end of each chapter, there is a list of vocabulary words. The student is expected to be familiar with these terms as a part of building their statistical literacy. There will be a vocabulary quiz after each chapter is covered. Each quiz will cover the five vocabulary words listed below for each chapter, **at a minimum.**

*Vocabulary Words*

- Chapter 1: Descriptive Statistics, Inferential Statistics, Population, Representative Sample, Sample
- Chapter 2: Class Frequency, Frequency Distribution, Histogram, Polygon, Raw Data
- Chapter 3: Empirical Rule, Measures of Central Tendency, Measures of Dispersion, Measures of Position, Standard Deviation
- Chapter 4: Complementary Events, Dependent Events, Independent Events, Law of Large Numbers, Sample Space
- Chapter 5: Binomial Experiment, Binomial Probability Distribution, Continuous Random Variable, Discrete Random Variable, Probability Distribution of a Discrete Random Variable
- Chapter 6: Continuity Correction Factor, Continuous Random Variable, Normal Probability Distribution, Standard Normal Distribution, z-value
- Chapter 7: Estimator, Nonsampling error, Sampling distribution of  $\hat{p}$ , Sampling distribution of  $\bar{x}$ , Sampling error
- Chapter 8: Confidence Interval, Confidence Level, Interval Estimate, Point Estimate, t-distribution
- Chapter 9: Alternative Hypothesis, Critical Value, Null Hypothesis, Significance Level, Test Statistic
- Chapter 10: Independent Samples, Paired Samples,  $\mu_d$ ,  $S_d$ ,  $\sigma_d$

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Homework (5%): At the end of each chapter is a Self-Review Test. The student is responsible for understanding the solution to each of the problems in the Self-Review Test; however, only 5 problems from each Self-Review Test will be assigned as homework problems. These 5 problems will be assigned a grade for completion; the solutions will be discussed in class. Homework in this course is intended as a guide to successful completion of the exams. Late homework will not be accepted.

*Homework Problems*

Chapter 1 Self-Review Test:	1, 2, 3, 6, 7
Chapter 2 Self-Review Test:	2, 5, 6, 8, 9
Chapter 3 Self-Review Test:	2, 15, 21, 23, 27
Chapter 4 Self-Review Test:	10, 12, 14, 18, 20
Chapter 5 Self-Review Test:	5, 6, 8, 15, 16
Chapter 6 Self-Review Test:	3, 9, 10, 11, 12
Chapter 7 Self-Review Test:	3, 13, 15, 17, 18
Chapter 8 Self-Review Test:	2, 8, 9, 10, 11
Chapter 9 Self-Review Test:	2, 7, 9, 16, 19
Chapter 10 Self-Review Test:	3, 4, 5, 6, 7

Math Lab (5%): Two (2) math labs will be offered throughout the semester with various exercises that support the instruction that students receive during the lectures. The student is expected to participate in each of these math labs.

- Upon completion of Math Lab 1, the student will be able to:
  - apply the basic *concepts* of the binomial probability distribution with *accuracy* (SLO #5).
- Upon completion of Math Lab 2, the student will be able to:
  - apply the basic *concepts* of sampling distributions with *accuracy* (SLO #7), and
  - estimate the mean and proportion of a population using *assumptions* with *accuracy* (SLO #8).

Exam Reviews (5%): Exam review sessions will be offered before each of the major exams. Participation in these exam review sessions promotes success on the exams. The student is expected to participate in each of these exam review sessions.

Major Exam 1 (25%): Major Exam 1 will cover Chapters 1 – 5 (student learning outcomes 1 – 5 listed above). Items on the exam will include vocabulary words and problems similar to those in the Self-Review Test of each chapter. Calculators are allowed, but no cell phones are allowed.

Major Exam 2 (25%): Major Exam 2 will cover Chapters 6 – 8 (student learning outcomes 6 – 8 listed above). Items on the exam will include vocabulary words and problems similar to those in the Self-Review Test of each chapter. Calculators are allowed, but no cell phones are allowed.

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Final Exam (30%): The Final Exam will be comprehensive and will cover Chapters 1 – 10 (student learning outcomes 1 – 10 listed above). Items on the exam will include vocabulary words and problems similar to those in the Self-Review Test of each chapter. Calculators are allowed, but no cell phones are allowed.

The end goal of these activities with respect to Applied Critical Thinking is to develop the student's Intellectual Traits– critical thinkers routinely apply intellectual standards to the elements of thought in order to develop the following intellectual traits:

- Intellectual Integrity
- Intellectual Humility
- Confidence in Reason
- Intellectual Perseverance
- Fair-mindedness
- Intellectual Courage
- Intellectual Empathy
- Intellectual Autonomy

Make-Up Exams/Vocabulary Quizzes: Make-up exams/vocabulary quizzes will be allowed on a case-by-case basis and only for extreme circumstances. If a student is granted a make-up exam/vocabulary quiz, the make-up exam/vocabulary quiz will be administered on Saturday, November 23, 2013, at 8:00 a.m.

Reporting of Assessment Results: Each question of the Final Exam will be aligned to one of the following Elements of Thought/Universal Intellectual Standards (ES) combinations identified in the Student Learning Outcomes listed above.

- *Concepts/Clarity*
- *Information/Logic*
- *Concepts/Accuracy*
- *Purpose/Relevance*
- *Assumptions/Accuracy*
- *Inferences and Conclusions/Significance*

The percent correct for each ES combination above will be calculated by aggregating data from the Final Exam. For each ES combination, the following assessment levels will apply:

Excellent: 90% - 100%  
Acceptable: 60% - 89%  
Unacceptable: 0% – 59%

There will be multiple real-world word problems on the exams. In order for a student to do well on the exams, he/she will need to be able to *clearly draw inferences and conclusions* using the connection between samples and populations as well as the connection between statistics and the

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real-world. The real-world problems on the Final Exam will be aggregated into a percent correct and used to evaluate how well the student makes connections as a part of applied critical thinking. The following assessment levels will apply:

Excellent: 90% - 100%  
Acceptable: 60% - 89%  
Unacceptable: 0% – 59%

Student labs and exams will be uploaded as artifacts into the University of Houston-Clear Lake Applied Critical Thinking software for archiving.

Extra Credit: There will be no opportunities for extra credit.

Final letter grade assignment:

A:	92.5 – 100
A-:	89.5 - 92.4
B+:	86.5 - 89.4
B:	82.5 - 86.4
B-:	79.5 - 82.4
C+:	76.5 - 79.4
C:	72.5 - 76.4
C-:	69.5 - 72.4
D+:	66.5 - 69.4
D:	62.5 - 66.4
D-:	59.5 - 62.4
F:	00.0 - 59.4

**Use of Class Products in Assessment**

The University of Houston–Clear Lake may use your work in this class to generate assessment data. Any works used will be used only for educational purposes.

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## MATH 3038 – 01 (Fall 2013) Tentative Schedule

8/27/13	Chapter 1: Introduction
8/29/13	Chapter 2: Organizing and Graphing Data Chap. 1 VQ; Chap. 1 HW Due
9/3/13	Chapter 3: Numerical Descriptive Measures Chap. 2 VQ; Chap. 2 HW Due
9/5/13	Chapter 3 - Cont.; Chapter 4: Probability
9/10/13	Chapter 4 - Cont. Chap. 3 VQ; Chap. 3 HW Due
9/12/13	Chapter 5: Discrete Random Variables and Their Probability Distributions Chap. 4 VQ; Chap. 4 HW Due
9/17/13	Chapter 5 - Cont.
9/19/13	Chapter 5 - Cont.
9/24/13	Math Lab; Chap. 5 VQ; Chap. 5 HW Due
9/26/13	Exam 1 Review
10/1/13	Exam 1 (1.5 hours)
10/3/13	Chapter 6: Continuous Random Variables and the Normal Distribution
10/8/13	Chapter 6 - Cont.
10/10/13	Chapter 7: Sampling Distributions Chap. 6 VQ; Chap. 6 HW Due
10/15/13	Chapter 7 - Cont.
10/17/13	Chapter 7 - Cont.
10/22/13	Chapter 8: Estimation of the Mean and Proportion Chap. 7 VQ; Chap. 7 HW Due
10/24/13	Chapter 8 - Cont.
10/29/13	Chapter 8 - Cont.
10/31/13	Math Lab; Chap. 8 VQ; Chap. 8 HW Due
11/5/13	Exam 2 Review
11/7/13	Exam 2 (1.5 hours)
11/12/13	Chapter 9: Hypothesis Tests About the mean and Proportion
11/14/13	Chapter 9 - Cont.
11/19/13	Chapter 9 - Cont.
11/21/13	Chapter 10: Estimation and Hypothesis Testing: Two Populations Chap. 9 VQ; Chap. 9 HW Due
<b>11/23/13(Sat)</b>	<b>Make Up Exam (8:00 a.m.)</b>
11/26/13	Chapter 10 – Cont.
11/28/13	Thanksgiving
12/3/13	Chapter 10 – Cont.
12/5/13	Final Exam Review Chap. 10 VQ; Chap. 10 HW Due
12/10/13	Final Exam (1:00 p.m. – 3:50 p.m.)

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