# Course Syllabus for:

# Psychology 2317: Statistical Methods in Psychology

Instructor: Dr. Clennis F. High

Spring Branch Campus/ Rm. 210

Wednesday, 7-10pm

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The Psychology Department Web Site is: <a href="http://nwc.hccs.cc.tx.us/psyc/">http://nwc.hccs.cc.tx.us/psyc/</a>

# **Course Description:**

This is an introduction to the use of scientific methods in psychology and to the statistical analysis of data. Attention is given to descriptive, correlational, and inferential statistical methodology

# **Course Prerequisites:**

:Students must be placed into college level reading (or take GUST 0342 as a corequisite) and be placed into college level writing (or take ENGL 0310/0319 as a corequisite) and be placed into MATH 0312 (or higher)

### **Course goals:**

After successfully completing this course, you should:

- A. Know key terms and major contributors pertaining to psychological statistics.
- B. Know how to set up and interpret datasets in charts, graphs, and distributions in meaningful ways.
- C. Understand the concepts of central tendency and dispersion, and be able to compute relative statistics.
- D. Understand correlation, and other inferential methods covered in this class.
- E. Understand the difference between descriptive and inferential statistics
- F. Be able to do calculations for descriptive and inferential statistics, and test hypotheses using the appropriate inferential distributions and formulae.
- G. Be able to apply the basic methods studied in this class in limited research endeavors.
- H. Be apprised of the scope and limitations of the various methods discussed in class.

#### **Student Learning Outcomes**

- 1. Define and identify basic concepts in inferential and descriptive statistics.
- 2. Explain and apply the concepts and procedures of descriptive statistics.
- 3. Describe and utilize principles of probability and hypothesis testing.
- 4. Apply and interpret common inferential statistical tests and correlational methods.
- 5. Learning objectives

**OBJECTIVES FOR SLO #1:** Define and identify basic general concepts in statistics.

# 1.1. CORE DOMAIN 1: General Statistical Concepts and Terminology

#### Define

- 1.1.1. Statistics
- 1.1.2. Population
- 1.1.3. Sample

- 1.1.4. Parameter
- 1.1.5. Statistic
- 1.1.6. Descriptive statistics
- 1.1.7. Inferential statistics
- 1.1.8. Sampling errors

# 1.2. CORE DOMAIN 2: Methodology

#### Define

- 1.2.1. The correlational method
- 1.2.2. The experimental method
- 1.2.3. Nonexperimental methods (quasi-experimental method)

### 1.3. CORE DOMAIN 3: Variables and Measurement

#### Define

- 1.3.1. Discrete variable
- 1.3.2. Continuous variable
- 1.3.3. Real limits
- 1.3.4. Scales of measurement
- 1.3.5. The nominal scale
- 1.3.6. The ordinal scale
- 1.3.7. The interval scale
- 1.3.8. The ratio scale
- 1.3.9. Summation notation (upper case sigma, for summation)

# **OBJECTIVES FOR SLO#2:** Describe and explain concepts and procedures of descriptive statistics..

# 2.1. CORE DOMAIN 1: Frequency Distributions

Describe and explain the procedure to construct

- 2.1.1 Frequency distribution tables
- 2.1.2. Frequency distribution graphs
- 2.1.3. Histograms
- 2.1.4. Polygons
- 2.1.5. Bar graphs

# 2.2 CORE DOMAIN 2: The Shape of a Frequency Distribution

#### Describe

- 2.2.1. Symmetrical distribution
- 2.2.2. Positively skewed distribution
- 2.2.3. Negatively skewed distribution

#### 2.3 CORE DOMAIN 3: Central Tendency

Describe and explain

- 2.3.1. Central tendency
- 2. 3.2. Types of central tendency
- 2.3.3. Features of the mean
- 2.3.4. Features of the median
- 2.3.5. Features of the mode

#### 2.4. CORE DOMAIN 4: Variability

Describe and explain

- 2.4.1. Variability
- 2. 4.2 Ranges
- 2.4.3. Variance
- 2.4.4. Standard deviation

#### 2.5 CORE DOMAIN 5: Z-Scores (Standardized Scores)

#### Describe and explain

- 2.5.1. Z Scores, formula and application
- 2.5.2 Features of the Z distribution
- 2.5.2. Other standardized distributions based on z-scores

# **OBJECTIVE FOR SLO#3:** Describe and explain probability theory and hypothesis testing procedure.

# 3.1. CORE DOMAIN 1: Probability

Describe and explain the computation of

- 3.1.1 Probability
- 3.1.2. Probability in a normal distribution (using the Unit Normal Table)
- 3.1.3. The Sampling Distribution of the mean

# 3.2. CORE DOMAIN 2: Sampling and Probability

Describe and explain

- 3.2.1. The distribution of sample means
- 3.2.2. The central limit theorem
- 3.2.3. The expected value of the sample means
- 3.2.4. The standard error

### 3.3 CORE DOMAIN 3: Hypothesis Testing

Describe and explain

- 3.3.1. Hypothesis testing steps
- 3.3.2. Types of hypotheses: Null and Alternative
- 3.3.3. Nondirectional (two-tailed) and Directional (one-tailed) tests
- 3.3.4. Region of rejection or critical values as a criterion
- 3.3.5. Types of decision: Reject and Fail to reject null hypothesis.
- 3.3.6. Type I errors
- 3.3.7. Type II error
- 3.3.8. Statistical Power
- 3.3.9. Effect size (Cohen's d)

# **OBJECTIVES FOR SLO#4:** Describe, explain, and compare various inferential statistical procedures.

# statistical procedures

#### 4.1 CORE DOMAIN 1: Single-Sample t test

Describe and compute

- 4.1.1. The single t test and it's assumptions
- 4.1.2. The t formula
- 4.1.3. The t distribution
- 4.1.4. Degrees of Freedom
- 4.1.5. Effect size

#### 4.2. CORE DOMAIN 2: The t test for independent samples

Describe and compute

- 4.2.1. The independent t test
- 4.2.2. The pooled variance
- 4.2.3. Effect size
- 4.2.4. Homogeneity of variance assumption

#### 4.3. CORE DOMAIN 3: The t test for related samples

Describe and compute

- 4.3.1. The t for related samples.
- 4.3.2. Repeated-measures design

- 4.3.3. Matched-subjects design.
- 4.3.4. Pros and cons of repeated-measures design
- 4.3.5. Effect size

#### 4.4 CORE DOMAIN 4: Estimation

Define and interpret

- 4.4.1. Purpose of Estimation
- 4.4.2. Point Estimation
- 4.4.5. Confidence Intervals
- 4.4.6. Estimation based on single-sample t
- 4.4.7. Estimation based on independent-measures t
- 4.4.8. Estimation based on related sample t

# 4.5 CORE DOMAIN 5: Analysis of Variance (ANOVA)

Explain and compute:

- 4.5.1. ANOVA: The F test and it's assumptions
- 4.5.2. F Distribution
- 4.5.3. Types of degrees of freedom: Between and Within
- 4.5.4. Types of Sum Squares: Between and Within
- 4.5.5. Types of Mean Squares: Between and Within
- 4.5.6. The ANOVA summary table, SSs, DFs, F5

#### 4.6. CORE DOMAIN 6: Correlation

Explain and describe:

- 4.6.1. Pearson's r
- 4.6.2. Types of correlations
- 4.6.3. Hypothesis testing with r

## 4.7. CORE DOMAIN 7: Regression

Explain and compute:

- 4.7.1. Regression and regression line
- 4.7.2. The least-squares solution
- 4.7.3. Coefficient of determination
- 4.7.4. Standard error of estimate

#### **SCANS** or Core Curriculum Statement and Other Standards

Credit: 3 (3 lecture)

As part of the core curriculum, this course is designed to help develop basic intellectual competencies such as reading, writing, listening, critical thinking and computer literacy. It offers the foundation for meeting the following educational objectives:

To apply arithmetic, algebraic, higher-order thinking and statistical methods to modeling and solving real-world situations.
To represent and evaluate basic statistical information verbally, numerically, graphically, and symbolically.
To expand statistical/mathematical reasoning skills and formal logic to develop convincing statistical/mathematical arguments.
To use appropriate technology to enhances statistical thinking and understanding, to solve statistical problems and provide critical evaluation of the results.
To interpret statistical/mathematical models such as formulas, graphs, and tables, and draw inferences from them.
To recognize the limitations of mathematical and statistical models.

# **Course Calender:**

Week 1. (8/31)	-Introduction to statistics/Ch 1
Week 2. (9/7)	-Ch. 2: Frequency Distributions
Week 3. (9/14)	Ch. 3: Central Tendency.
Week 4. (9/21)	Ch. 4. Variability
Test 1	
Week 5. (9/28)	Ch. 5: Z-Scores and standard distributions
Week 6. (10/5)	Ch. 6: Probability
Week 7. (10/12)	Ch. 7: Probability/ Probability & Samples
Week 8. (10/19)	Ch. 8: Introduction to hypotheses testing
Test 2-	
Week 9. (10/26)	Ch.9: Intro to t-test
Week 10 (11/2)	Ch10 t-test for independent samples
Week 11.(11/9)	Ch.11: : t-test for related samples
Week 12 (11/16	Ch 12. Estimation
Test 3	
Week 13. (11/23)	Holiday
Week 14. (11/)	Ch.13: Intro to ANOVA
Week 15. (12/8)	-Ch.15: Correlation
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**Final Examination** -----12/14

# **Instructional Methods**

PSYC 2317 is an introduction to the basic concepts and application of statistics in psychology. Statistical techniques are tools that are used to organize information and make inferences from data.

As your instructor, I will present course materials in an organized and systematic way. I will explain the statistical concepts by relating to real-life examples and lay out the computational steps clearly on the board. All material covered on test will be covered by this instructor before students are tested on it. My intent is to put students at a place where they understand these basic concepts; understand research results, and in some cases conduct simple projects.

#### **Tests and assignments**

Your average will be based on your performance on four tests and a series of homework assignments. The three tests and regular homework will be weighed equally. Please see the table below.

Test I (September 21, 2011)	= 25%
Test II (October 19, 2011)	= 25%
Home work	= 25% Due December 7 <sup>th,</sup> 7pmno late homework accepted!!
Test III (November 16, 2011)	= 25%
Test IV (December 14th, 2011)	<u>= 25%</u> (final exam) 100%

Note: there will be four tests. The lowest test score for the first three will be dropped, but the final exam is mandatory. Also, be advised <u>there will be no make-up test under</u> <u>any circumstances in this class!</u> Your final grade will be calculated using two test scores, <u>homework assignments and the final examination.</u>

By adding all numeric scores given for each item (4) and dividing that total by four will give your average. Keep up with your test scores and homework assignments, and you will always know your average.

Homework assignments: You will be given a total of twenty problems that cover the material we go over in class. These problems will cover all the procedures we cover throughout the semester. You will be responsible for turning the homework in by the due date. Students must complete homework on their own as I will cover the material before hand in class. I do encourage students to work together on the homework assignments if they would like to do so.

# **Grading:**

Your final grade for the course will be based on your final average for the course. Letter grades can range from "A" to "F", and are associated with your average as follows:

Average	Letter Grade
90 & above	A
80-89	В
70-79	C
60-69	D
59 & Below	F

#### **Textbook and other resources:**

Essentials of Statistics for the Behavioral Sciences, 7th Edition, by Frederick Gravetter & Larry B. Wallnau. The book is published by Wadsworth/Thomson learning. The website for the book is: <a href="http://psychology.wadsworth.com">http://psychology.wadsworth.com</a>. All resource material that accompanies the textbook will be used in this class. A scientific calculator is also required and should be brought to every class along with your book.

# HCC Policy Statement - ADA <u>Services</u> to Students with Disabilities

Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the Disability Services Office at the respective college at the beginning of each semester. Faculty is authorized to provide only the accommodations requested by the Disability Support Services Office. The ADA counselor at Northwest College is Mahnaz Kolaini (713-718-5422).

#### **HCC Policy Statement: Academic Honesty**

A student who is academically dishonest is, by definition, not showing that the coursework has been learned, and that student is claiming an advantage not available to other students. The instructor is responsible for measuring each student's individual achievements and also for ensuring that all students compete on a level playing field. Thus, in our system, the instructor has teaching, grading, and enforcement roles. You are expected to be familiar with the

University's Policy on Academic Honesty, found in the catalog. What that means is: If you are charged with an offense, pleading ignorance of the rules will not help you. Students are responsible for conducting themselves with honor and integrity in fulfilling course requirements. Penalties and/or disciplinary proceedings may be initiated by College System officials against a student accused of scholastic dishonesty. "Scholastic dishonesty": includes, but is not limited to, cheating on a test, plagiarism, and collusion.

Cheating	on	а	test	incl	udes:
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Copying from another students' test paper;
Using materials not authorized by the person giving the test;
Collaborating with another student during a test without authorization;
Knowingly using, buying, selling, stealing, transporting, or soliciting in whole or part
the contents of a test that has not been administered;
Bribing another person to obtain a test that is to be administered.

<u>Plagiarism</u> means the appropriation of another's work and the unacknowledged incorporation of that work in one's own written work offered for credit.

<u>Collusion</u> mean the unauthorized collaboration with another person in preparing written work\_offered for credit. Possible punishments for academic dishonesty may include a grade of 0 or F in the particular assignment, failure in the course, and/or recommendation for probation or dismissal from the College System. (See the Student Handbook)

# **HCC Policy Statements**

Class Attendance - It is important that you come to class! Attending class regularly is the best way to succeed in this class. Research has shown that the single most important factor in student success is attendance. Simply put, going to class greatly increases your ability to succeed. You are expected to attend all lecture and labs regularly. You are responsible for materials covered during your absences. Class attendance is checked daily. Although it is your responsibility to drop a course for nonattendance, the instructor has the authority to drop you for excessive absences.

If you are not attending class, you are not learning the information. As the information that is discussed in class is important for your career, students may be dropped from a course after accumulating absences in excess of 12.5% hours of instruction. The six hours of class time would include any total classes missed or for excessive tardiness or leaving class early.

You may decide NOT to come to class for whatever reason. As an adult making the decision not to attend, you do not have to notify the instructor prior to missing a class. However, if this happens too many times, you may suddenly find that you have "lost" the class.

Poor attendance records tend to correlate with poor grades. If you miss any class, including the first week, <u>you are responsible for all material missed</u>. It is a good idea to find a friend or a buddy in class who would be willing to share class notes or discussion or be able to hand in paper if you unavoidably miss a class.

Class attendance equals class success.

# **HCC Course Withdrawal Policy**

If you feel that you cannot complete this course, you will need to withdraw from the course prior to the final date of withdrawal. Before, you withdraw from your course; please take the time to meet with the instructor to discuss why you feel it is necessary to do so. The instructor may be able to provide you with suggestions that would enable you to complete the course. Your success is very important. Beginning in fall 2007, the Texas Legislature passed a law limiting first time entering freshmen to no more than **SIX** total course withdrawals **throughout** their educational career in obtaining a certificate and/or degree.

To help students avoid having to drop/withdraw from any class, HCC has instituted an Early Alert process by which your professor *may* "alert" you and HCC counselors that you might fail a class because of excessive absences and/or poor academic performance. It is your responsibility to visit with your professor or a counselor to learn about what, if any, HCC interventions might be available to assist you – online tutoring, child care, financial aid, job placement, etc. – to stay in class and improve your academic performance.

If you plan on withdrawing from your class, you may withdraw yourself online (except for flex entry classes) OR contact a HCC counselor or your professor to withdraw you. This must be done **PRIOR** to the withdrawal deadline to receive a "W" on your transcript. (\*\*Final withdrawal deadlines vary each semester and/or depending on class length, please visit the online registration calendars, HCC schedule of classes and catalog, any HCC Registration Office, or any HCC counselor to determine class withdrawal deadlines.) **Remember to allow sufficient time (at least 24- hour response time) when communicating via email and/or telephone with a professor and/or counselor. Do not submit a request to discuss withdrawal options less than a day before the deadline. Some professors may not be willing to process the withdrawal requests or have specific timelines for processing withdrawal requests, please consult with your individual professor for details.** 

In this class, I prefer you to take the responsibility to withdraw yourself or contact a counselor to help you withdraw. If you want me to process your withdrawal request, you must submit it in writing or by e-mail to me 3 days before the withdrawal deadline (11/15/2011,4:30pm). If you do not withdraw before the deadline, you will receive the grade that you are making in the class as your final grade.

#### **Repeat Course Fee**

The State of Texas encourages students to complete college without having to repeat failed classes. To increase student success, students who repeat the same course more than twice, are required to pay extra tuition. The purpose of this extra tuition fee is to encourage students to pass their courses and to graduate. Effective fall 2006, HCC will charge a higher tuition rate to students registering the third or subsequent time for a course. If you are considering course withdrawal because you are not earning passing grades, confer with your instructor/counselor as early as possible about your study habits, reading and writing homework, test taking skills, attendance, course participation, and opportunities for tutoring or other assistance that might be available.

#### **International Students**

Receiving a W in a course may affect the status of your student Visa. Once a grade of "W "is given for the course, it will not be changed to an F because of the visa consideration. Please contact the International Student Office at 713-718-8520, if you have any questions about your visa status and other transfer issues.

#### **Classroom Behavior**

As your instructor and as a student in this class, it is our shared responsibility to develop and maintain a positive learning environment for everyone. Your instructor takes this responsibility very seriously and will inform members of the class if their behavior makes it difficult for him/her to carry out this task. As a fellow learner, you are asked to respect the learning needs of your classmates and assist your instructor achieve this critical goal.

### **Use of Camera and/or Recording Devices**

As a student active in the learning community of this course, it is your responsibility to be respectful of the learning atmosphere in your classroom. To show respect of your fellow students and instructor, you will turn off your phone and other electronic devices, and will not use these devices in the classroom unless you receive permission from the instructor.

Use of recording devices, including camera phones and tape recorders, is prohibited in classrooms, laboratories, faculty offices, and other locations where instruction, tutoring, or testing occurs. Students with disabilities who need to use a recording device as a reasonable accommodation should contact the Office for Students with Disabilities for information regarding reasonable accommodations

# **Instructor Requirements**

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		Facilitate an effective learning environment through class activities, discussions,
		and lectures
		Description of any special projects or assignments
		Inform students of policies such as attendance, withdrawal, tardiness and make up
		Provide the course outline and class calendar which will include a description of any
		special projects or assignments
		Arrange to meet with individual students before and after class as required
To l	oe:	successful in this class, it is the student's responsibility to:
		Attend class and participate in class discussions and activities
		Read and comprehend the textbook material
		Do the selected problems as suggested by the instructor and use the textbook
		website for practice quizzes.
		Complete the required assignments and exams.
		Ask for help when there is a question or problem that is not clear
		Keep copies of all paperwork, including this syllabus, handouts and all assignments
		Practice! Practice! Study! Study! Study!

#### **Students with Disabilities:**

Any student with a documented disability (e.g. physical, learning, vision, hearing, etc.) who needs to arrange for reasonable accommodations must contact the appropriate counselor at the college you attend. At northwest college, please contact our ADA counselor at (713) 718-5708.

# **Inappropriate behavior and Scholastic Dishonesty:**

Students are expected to behave in a manner conducive to maintaining a learning atmosphere. This instructor will treat each and every student with dignity and respect. It is expected that this be reciprocated to the instructor and each class member. Also, academic dishonesty is not accepted by this institution, or by this instructor. This includes, but is not limited to, plagiarism, test cheating and copying, bribing, using unapproved material during a test, or collusion. Any

student found participating in any of these will be referred to the appropriate school authorities for disciplinary action. **Please turn off cell phones in this class.** 

#### Attendance and Withdrawal.

It is important to attend this class, or any class, regularly to be successful. The School's policy indicates that a student with 6 unexplained absences might be dropped from that class. In order for this instructor to excuse and absence, the student must provide a written explanation and additional supporting documents (such as a doctors note, court paper, etc.). Also, if a student is tardy three times (more than ten minutes late) without prior approval or a good reason, he/she will be given one unexcused absence. It is always appreciated when a student notifies the instructor in advance of and upcoming absence, tardy, or need to leave early. A student with three unexplained absences will be dropped from this class. There is no grade given for good attendance, as it is to the student's advantage, as well as their responsibility, to come to class regularly. Moreover, data collected on my classes over the past 5 years indicate that the more often students attend class the higher their overall grade point average. Students with poor attendance tend to receive poor grades. Hence, there is a positive correlation between one's grade and their attendance behavior.

Also, from time to time students find it necessary to drop a class. I ask that you speak to this instructor prior to then to see if we can explore other options. However, if there is no other option available to the student the class <u>must</u> be dropped by 4:30pm November 3, 2011 to receive a grade of "W". It is the student's responsibility to drop the class. Failing to do this will result in a grade of "F" for this class.

Although this instructor does not include attendance as part of the grade, it should be made clear that regular attendance in a rigorous class such as this greatly increases student success.

Please ask your instructor or counselor about opportunities for tutoring or other assistance prior to considering course withdrawal, or if you are not receiving passing grades.

*INTERNATIONAL STUDENTS:* Receiving a W in a course may affect the status of your student Visa. Once a W is given for the course, it will not be changed to an F because of the visa consideration. Please contact the International Student Office at 713-718-8520, if you have any questions about your visa status and other transfer issues.

**Tardiness**: Any student tardy more than three times in this class without advising the instructor in advance will be charged one absence. That is to be understood that three unapproved events will equal one absence in this class.

# **Student Information:**

Although this syllabus is designed to give an overview of the expectations and highlights of this class, it is impossible to cover all the college rules, regulations and procedures here. It is strongly recommended that students get a copy of the current "student handbook" and catalog and read them thoroughly. There is much information that is very important to the student's academic progress. These can be found at the counseling office on every HCC campus. It is also a good idea to visit the counselor's office to discuss your degree plan and career endeavors. This helps to assure you are taking the proper courses.

#### **Consultation:**

If a student has a need to meet with the instructor for a class related issue, I will be available here at this campus on Wednesday evenings from 5:45-6:45. Please advise the instructor in advance. I may be reached at the telephone number given in the front section of this syllabus. In some cases it may be appropriate to call to discuss the matter. Please do not show up during the period when I am putting the lecture material on the board, UNLESS we have a prior agreement to meet; this takes time and concentration.

#### **Course Content:**

Statistics can be a complex discipline with its mathematical theories and sometimes-cumbersome computations. It is not expected that you will learn all there is to know in this introductory class. However, there are important concepts that every student should be comfortable with after taking an introductory statistical methods class. Students should understand what statistics entails, and should master simple computations. All other classes you may take after this class (in statistics) will build from what I have taught you. This is important for many reasons. Understanding basic concepts in statistics helps us all be better consumers of research, which in most cases effects us all at some point. Also, many students will continue on to various graduate programs, and are likely to be required to utilize statistics in some way to complete their studies. The content and subject matter addressed in this class focuses on the various ways in which a student may be able to apply statistical knowledge, and how statistics are used in our world. The material taught in this class may be important to you one day-learn it well!

Note that on some meetings we will be introduced to information for two chapters. You will be given the chapters as reading assignments before hand, and the lecture will include explanations and examples of those chapters. Also because we meet only once a week, it is necessary to cover a chapter in lecture and have that chapter covered on the test in the same class period. So this requires that you read the chapter prior to class, and the instructor will cover the material and provide examples. YOU MUST READ IN THIS CLASS!!!

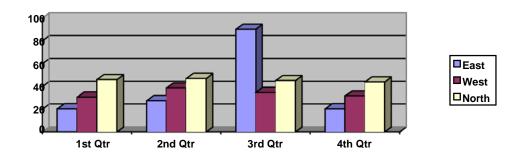
#### **Final Note**

I have structured this class so it will be a learning experience, which will enhance your understanding of statistics, its uses, and misuses. This class will be taught in a non-threatening manner with emphasis on student learning and student success. You will be introduced too much new material and concepts, and will be expected to compute data after being taught how to do so. The grading system is straight forward, and **good attendance and thorough reading** will increase the probability that you will **achieve** a good grade. Course syllabi are intended to provide students with basic information concerning the course. The syllabus can be viewed as a "blueprint" for the course; changes in the syllabus can be made and students will be informed of

any substantive changes concerning examination, the grading or attendance policies, and changes in project assignments.

# EGLS<sub>3</sub> -- Evaluation for Greater Learning Student Survey System

At Houston Community College, professors believe that thoughtful student feedback is necessary to improve teaching and learning. During a designated time, you will be asked to answer a short online survey of research-based questions related to instruction. The anonymous results of the survey will be made available to your professors and division chairs for continual improvement of instruction. Look for the survey as part of the Houston Community College Student System online near the end of the term.



# Welcome to the World of...



Statistics!!!