Marshall University

STA 225 – SEC 104: Introductory Statistics (CT)
CRN 4036 – Fall 2018
Class Time: TR 12:30 – 1:45 PM
Location: Smith Hall 516
(Tentative Syllabus)

INSTRUCTOR: Dr. Raid Al-Aqtash
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OFFICE HOURS: M&W 10:00 AM – 12:50 PM, others by appointment.

UNIVERSITY POLICIES: By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to
http://www.marshall.edu/academic-affairs/policies/
Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment. The most recent revision of the 2015-2016 undergraduate catalog can be obtained at
http://www.marshall.edu/catalog/files/UG_15-16_final_published.pdf

Academic Integrity:
- The University Rules, including the Code of Conduct, and other documented policies of the department, college, and university related to academic integrity, will be enforced. **Any violation of these regulations will be dealt with on an individual basis according to the severity of the misconduct**.

- Please note that **any act** of *Plagiarism*, *Cheating*, or/and *Academic Dishonesty* will be **prosecuted to the maximum extent according to MU catalog**.

CLASS RULES:
1. **SILENT YOUR PHONES**. Students are advised to turn their cell phones and other noise generating devices off prior to entering the class. In the case where a student awaits any emergency call, the noise should be restricted and made personal. And in this case, I should be notified as soon as the student enters the class.

2. If you need to leave the class early, inform your instructor before the class begins. Please **show your respect** to your classmates and your instructor.

3. Food items, apart from water or soft drink, are not allowed in the class.

4. The reading of newspapers and other unrelated materials while the class is in session is prohibited.

5. **Good attendance is a major key to success in this (or any) class!** Students are expected to attend all scheduled classes. If you should miss a class, then it is your responsibility to find what was discussed on that class period.

COURSE DESCRIPTION: A critical thinking course in applied statistical reasoning covering basic probability, descriptive statistics and fundamental statistical inference procedures. Parameter estimation and hypothesis testing for variety of situations with wide applications. More on course objectives and learning outcomes appear on the 2nd and 3rd page of this document.

PREREQUISITES:
MTH 121 with a grade of C or higher, or at least 21 on Math ACT, or at least 500 on Math SAT.

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CRITICAL THINKING "CT" RELATED LEARNING OUTCOMES ADDRESSED, PEDAGOGICAL METHODS, AND CLASSROOM ASSESSMENTS

Course Student Learning Outcomes	How students will practice each outcome in this Course	How student achievement of each outcome will be assessed in this Course
1: Integrative Thinking: Students will make connections and transfer skills and learning among varied disciplines, domains of thinking, experiences, and situations.	o Homework assignments o Quizzes	Exams and course project.
2: Communication Fluency: Students will develop cohesive oral, written, and visual communications tailored to specific audiences. ➢ Students will select and produce appropriate graphical, tabular, and numerical summaries of the distributions of variables in a data set. Summarize such information into verbal descriptions. ➢ Students will construct a model for a random phenomenon using outcomes, events, and the assignment of probabilities. Use the addition rule for disjoint events and the multiplication rule for independent events.	o Classroom discussions o Homework assignments o Quizzes o project report drafts	Exams and course project.
3: Inquiry Based Thinking: Students will formulate focused questions and hypotheses, evaluate existing knowledge, collect and analyze data, and draw justifiable conclusions. ➢ Given research questions involving a single population or two populations, student will be able to formulate null and alternative hypotheses. Describe the logic and framework of the inference of hypothesis testing. Make decisions using classical and p-value approaches and draw appropriate conclusions. Interpret statistical and practical significance in this setting.	o Homework assignments o Quizzes	Exams and course project.
4: Metacognitive Thinking: Students will evaluate the effectiveness of a project plan or strategy to determine the degree of their improvement in knowledge and skills.	o Classroom discussions	Exams and course project.
5: Quantitative Thinking: Students will analyze real-world problems quantitatively, formulate plausible estimates, assess the validity of visual representations of quantitative information, and differentiate valid from questionable statistical conclusions. ➢ Students will select and produce appropriate graphical, tabular, and numerical summaries of the distributions of variables in a data set. ➢ Students will summarize relationships in bivariate data using graphical, tabular, and numerical methods including scatter plots, correlation coefficients, and least squares regression lines. ➢ Students will be able to recognize the difference between discrete and continuous random variables and probability distribution. Especially use the normal distribution to interpret z-scores and compute probabilities. ➢ Students will estimate a population mean, a population proportion or difference between means and difference between proportions using point estimates and confidence intervals and interpret the confidence level and margin of error. Understand the dependence of margin of error on sample size and confidence level.	o Homework assignments o Quizzes	Exams and course project.

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eBook: Understandable Statistics: Concepts and Methods, 12th Edition, 2017, by Brase & Brase.
WebAssign Access Card {includes eBook Access}   ISBN: 9781337652551

REFERENCES:
➢ *Elementary Statistics***:** *A Step by Step Approach***, by Bluman.**
➢ *The Basic Practice of Statistics***, by Moore, Notz and Flinger.**
➢ *Statistics, Informed Decisions Using Data***, by Michael Sullivan.**

MATERIAL: We will cover most of the chapters of the text, with additional topics as time allows.
　　Week 1-5:　　Chapter 1, 2, 3, 4　　　　　　　　　　　　(Test#1)
　　Week 6-11:　Chapter 5, 6, 7　　　　　　　　　　　　　(Test#2)
　　Week 12-15: Chapter 8, 9, & Final Test Review.

CALCULATOR: **A graphing calculator (i.e.TI-83, TI-84, or similar) is required**.
- You may use the calculator on all work and assignments in this class.
- You may not use your phone, iPad, laptop, etc. as a calculator on any quiz or exam.
- No other technology may be used in class without permission.

GRADED WORK: (700 points)

1. Exams:

There will be two in-class midterm tests and a final exam. **The final exam will be cumulative & comprehensive**. In case of extreme emergency, serious illness, or university related activity, when I have been notified with evidence or approval, or excused absences approved by the Dean of Student Affairs, the student will be allowed to make up the missed exam.
　　Test#1: *Thursday, September 20th, 2018*　　　　　(100 points)　~ 14.3%
　　Test#2: *Thursday, November 1st, 2018*　　　　　　(100 points)　~ 14.3%
　　Final Exam: *Tuesday, December 11th, 2018, 12:45 – 2:45 PM*　(150 points)　~ 21.4%

2. Homework Assignment - WebAssign:　　　　　　　　　(100 points)　~ 14.3%

WebAssign will be used for online homework. There will be at least one homework assignment each week, TBD. WebAssign Access Card can be purchased at the MU Bookstore or Cengage .com website. To enroll in our class on WebAssign, go to our course on blackboard > WebAssign HW and eBook. Follow the instructions to start your trial access {14 days grace period}
Our class on WebAssign has the following Class Key (ID):　**marshall 4104 6608**
It is your responsibility to stay informed/up-to-date about classwork & homework due dates.

3. Quizzes and Classroom Activities:　　　　　　　　　(75 points)　~ 10.7%

There will be at least six {quizzes/class activities} TBD. Each quiz/activity weighs 15 points. **The highest 5 will count**.

4. Project　　　　　　　　　　　　　　　　　　　　　(125 points)　~ 17.9%
The project consists of four parts. See Page 5 & 6 for more details about this part.

5. ATTENDANCE　　　　　　　　　　　　　　　　　　(50 points)　~ 7.1%
　　　　　Good attendance is a major key to success in this (or any) class!

　　Attendance Policy:
+ Students are expected to attend all scheduled classes. **I'll reserve the right to drop 2 points for each absence**. It is the student's responsibility to find out what was discussed in a missed class.

+ **In case of an emergency, when I am notified ahead of time, or when the absence is excused by the office of the dean of affairs, a student will be allowed to makeup a missed work.**

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Roughly speaking 90% is at least an A , 80% is at least a B, 70% is at least a C, 60% is at least a D. Final grades will be determined by the end of the semester.

MATH TUTORING SERVICES: Marshall University provides multiple options for free on-campus tutoring. It is the student's responsibility to take advantage of these facilities in addition to utilizing office hours.

➢ The Mathematics Department tutoring lab is located in Smith Hall 625. The tutoring hours are:
- Monday-Thursday: 10:00am to 4:00pm, 5:00 to 6:30.
- Friday: 10:00am to noon

The current schedule can be found at   http://www.marshall.edu/math/tutoring/
Schedules for the new semester are usually posted during the second week of classes.

➢ The University College has a tutoring lab Smith Communications Building (Room 211). Information regarding this facility can be found at http://www.marshall.edu/uc/tutoring-services/ .

DROP: The last day to drop class (no entry to academic record) is Friday, August 24th, 2018.

Labor Day (Monday September 3rd 2018) – University closed.

Withdrawals: Friday (October 26th, 2018) is the last day to withdraw "W" from the class.

Thanksgiving recess (Monday November 19th – Saturday November 24th) Classes dismissed.

Dead Week (Monday December 3rd – Friday December 7th).

The complete academic calendar is available at
https://www.marshall.edu/academic-calendar/fall-semester-2018/

Blackboard / Electronic Communications:
MUonline <Blackboard> will be used to post pertinent class information and course documents. For technical problems with Blackboard contact IT Services Desk 304-696-3200.

Special Needs Policy:
Policy for Students with Disabilities: Marshall University is committed to equal opportunity education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disability Services (ODS) in Prichard Hall 117 (304.696.2467) to provide documentation of their disability. Following this, the ODS Coordinator will send a letter to each of the student's instructors outlining the academic accommodation he/she will need to ensure equality in classroom experience, outside assignment, testing, and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, access the website for the Office of Disabled Student Services:
http://www.marshall.edu/disabled

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Project Description (125 points) ~ 17.9% of the total score.

For this project, you will be collecting a data in order to make inferences about the population from which the data come. Many data sets will be posted on blackboard, and you can pick any of them or use your own data.

Often, one of the most difficult parts of the research process is coming up with an idea (or problem). To make the project meaningful, try to think of some problem that you would be interested to solve. Just keep in mind that you will be gathering quantitative data from two groups. Here are some sample questions:

- Do you think the average ages of coins are different? (e.g. pennies vs. nickels)
- Do you think there is a difference in the average cost of a haircut for males versus females?
- Do cereals placed on the top shelf at the grocery store cost more than cereals placed on the bottom shelf?
- Is the average income per household greater for people living on the west coast or for people living on the east coast? (Tip: the U.S. Census Bureau web site is an excellent source for information about every state—think about using it to gather your data. http://www.census.gov/)
- Do magazines aimed at a male audience cost less than magazines aimed at a female audience?

You do not have to use any of the above ideas, but they may give you a good starting point. Just keep in mind, as you are trying to come up with an idea, about how you will be collecting data. **Also you must have a minimum of 30 observations in each group**.

You need to design your project and collect data in such a way that it doesn't require IRB approval. For example, you are not allowed to collect data (or information) on any personal characteristic of a person or animal, such as height or weight.

The project will consist of 4 distinct parts. In the first two parts, you will be summarizing data from each group and then compare those using descriptive statistics and graphical displays. In part three, you will be carrying out statistical inference and in the last part **you need to combine your findings from all parts to write a complete report**.

Part I: **Introduction** (Due on Week 3: Turn in one page report) (25 points) ~ 3.6% of the total score.

Talk about your project idea, how you came up with the idea, what your null and alternative hypotheses are (e.g.., do you think one group will have a greater mean than another, or do you simply think the groups will be different?), and how you gathered your data?

Part II: **Data description** (Due on Week 5)   (25 points) ~ 3.6% of the total score.

Create a histogram and/or any other appropriate graphical display for data in each of your groups (e.g., if you are comparing pennies and nickels on age, one histogram will be age of pennies and another will be age of nickels). Compute summary statistics for each group and discuss what the graphs and summary statistics tell you about the two groups. Talk about any similarities and differences you detect between the groups, and indicate which summary statistics (based on the shapes of your distributions) would most accurately summarize your variable?

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Part III: **Estimation and inference ideas** (Due on Week 12)   (25 points) ~ 3.6% of the total score.

For each group, estimate the appropriate parameter of interest using point estimation as well as by constructing a confidence interval. Compare the point estimates and the confidence intervals from the two groups. In your own words, interpret the intervals and summarize your findings. Also, indicate an interesting idea to be tested against a given fact about a population parameter.

Part IV: **Final Report** (Individual - Due on the day of the Final Exam)   (50 points) ~ 7.1% of the total score.

In the final report, **you need to combine your findings from all the previous parts and write a complete final report**. In your report, you need to address the following:

- Briefly summarize what you did for this project and what are your findings.
- Discuss any shortcoming of the methods you have used to summarize data.
- Did you discover anything that surprised you when you analyzed the data?
- Do you think the results would have been different if you had bigger sample sizes?
- If you had to do the project again, how would you do it differently?

To comply with CT courses requirements, all project artifacts & final report need to be uploaded to blackboard. More INFO on this upload will be announced later in the semester.