Course Name: Foundations of Data Analytics
Course Number: ST516
Term Offered: Fall 2017
Credits: 4
Instructor name: Charlotte Wickham
Instructor email: wickhamc@stat.oregonstate.edu
Teaching Assistant: Kalbi Zongo zongok@science.oregonstate.edu

Course Description
Foundations of estimation and hypothesis testing; desirable properties of estimators; maximum likelihood; one- and two-sample problems; theoretical results are explored through simulations and analysis using R.
Prereqs: ST 351

Communication
Please post all course-related questions in the Q&A Discussion Forums for each week so that the whole class may benefit from our conversation. Please email me (wickhamc@stat.oregonstate.edu) for matters of a personal nature. I will reply to course-related questions and email within 24-48 hours. I will strive to return your assignments and grades for course activities to you within five days of the due date.

Course Credits
This course combines approximately 120 hours of instruction, online activities, and assignments for 4 credits.

Canvas
This course will be delivered via Canvas where you will interact with your classmates and with your instructor. Within the course Canvas site, you will access the learning materials, such as the syllabus, class discussions, assignments, projects, and quizzes. To preview how an online course works, visit the Ecampus Course Demo. For technical assistance, please visit Ecampus Technical Help.

Technical Assistance
If you experience computer difficulties, need help downloading a browser or plug-in, assistance logging into the course, or if you experience any errors or problems while in your online course, contact the OSU Help Desk for assistance. You can call (541) 737-3474, email osuhelpdesk@oregonstate.edu or visit the OSU Computer Helpdesk online.

Course Content

The goal of this class is to review the ideas in probability that provide a basis for statistical inference. We'll emphasize understanding through simulation rather than mathematical abstraction. You will interact with simulations created for you, and learn skills in R to generate and explore simulations on your own. Exploration will be motivated by one and two sample comparisons and consequently you will learn the common methods for approaching these problems.

Measurable Student Learning Outcomes

After completing this class, a you will be able to:

- Evaluate the validity of inferential conclusions in a study.
- Use simulation to evaluate probabilistic properties of a random variable
- Evaluate the properties of a test, estimate or confidence interval procedure using simulation in R.
- Identify and apply appropriate methods for one and two sample problems.
- Interpret the results of a procedure in a non-technical manner in the context of a study.

Learning Resources

The course is composed of 10 week-long modules. The **learning materials** for a module consist of:

- **Readings** (see below Assigned Reading section below).
- **Lectures** 4-6 Narrated Adobe Presenter lectures (slides with a voiceover) that cover the topics for the week and important concepts from the readings.
- **Computer lab** Self-paced exercises in R intended to teach you how to perform computer simulations to understand the properties of procedures as well as perform data exploration and statistical analyses.

Within each module, the following **learning assessments** are due (exact **due dates** are found in the Syllabus section of the canvas course site):

- two discussion board posts,
- two quizzes,
- submission of your lab work, and
- a homework assignment

The last two modules are a little different. There is no homework, lab, discussion or quiz. Instead you are beginning and completing your final project.

Reccomended Approach

Within a module the learning resources aren't in any particular order. The readings and lectures come first, but that doesn't mean you need to complete them **all** before moving on to the other pages. You will however always want to complete the computer lab before attempting the first question on the homework, and generally after the readings and lectures. You will probably find iterating between lectures, reading and glancing over relevant homework problems the best way to work through the material.

Topic Schedule

Week	Topic
1	Introductions, Scope of Inference
2	Probability and random variables
3	Moments, law of large numbers, central limit theorem
4	Foundations of statistical inference
5	One sample procedures for central tendency
6	Two sample procedures for central tendency
7	The role of assumptions
8	Additional Procedures
9	Case Studies and Coding
10	Putting it all Together: Final Project

Assigned Readings

The following textbooks will be the primary sources of assigned readings in each module. These four books are either freely available online, or can be accessed for free through the OSU library. Additional readings may be assigned and will be provided as needed.

1. *Statistical Methods.* Freund, R.; Mohr, D; Wilson,W. (2010).
   http://OSU.eblib.com/patron/FullRecord.aspx?p=802390

2. *Foundational and Applied Statistics for Biologists Using R.* Aho, K. (2013)
   http://OSU.eblib.com/patron/FullRecord.aspx?p=1480891

3. *OpenIntro Statistics.* Diez, D.; Barr, C.; Çetinkaya-Rundel, M. 3rd Ed. (2015)
   https://www.openintro.org/stat/textbook.php

4. *Intro Stat with Randomization and Simulation.* Diez, D.; Barr, C.; Çetinkaya-Rundel, M. 1st Ed. (2014) https://www.openintro.org/stat/textbook.php?stat_book=isrs

Computing Resources

For the computing component of the course you will use R (a programming language and environment for data analysis) and RStudio (a program we will use to interact with R). You must have access to R and RStudio to complete the labs, homeworks and some quizzes. R and RStudio are both free. You have two options for accessing R and RStudio:

1. (**Recommended**) Use the RStudio server at http://rstudio.cosine.oregonstate.edu. Log in with your ONID ID. You don't need to install anything, and your session is available from any computer.
2. Or, install R (https://www.r-project.org/) and RStudio (https://www.rstudio.com/products/rstudio/download/) on your own computer (instructions provided in the first week).

Some labs will require students to complete interactive R exercises at DataCamp (http://www.datacamp.com). To make sure your progress is recorded use the links provided in the corresponding assignments. This will also sign you up for a free account and join you to the group "ST516_Fall_2017".

Evaluation of Student Performance

- Discussions – 16 points
- Labs – 40 points
- Quizzes – 64 points
- Homework – 80 points
- Final Project – 40 points
- **Total – 240 points**

Grading Scale

Final percentages will be converted to letter grades according to the following scheme.

Percent	Grade		Percent	Grade
95-100	A		65-69.9	C+
88-94.9	A-		60-64.9	C
80-87.9	B+		55-59.9	C-
75-79.9	B		45-54.9	D
70-74.9	B-		0-45	F

Course Policies

Discussion Participation
Students are expected to participate in all graded discussions. While there is great flexibility in online courses, this is not a self-paced course. You will need to participate in our discussions on at least two different days each week, with your first post due no later than Wednesday evening, and your second and third posts due by the end of each week.

Proctored Exams
There are **no** proctored exams for this course.

Incompletes
Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child), and if the student has turned in 80% of the points possible (in other words, usually everything but the final paper). If you are having any difficulty that might prevent you completing the coursework, please don't wait until the end of the term; let me know right away.

Guidelines for a Productive and Effective Online Classroom
Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility.

Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:
- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

Statement Regarding Students with Disabilities
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Accessibility of Course Materials
All materials used in this course are accessible. If you require accommodations please contact Disability Access Services (DAS).

This course is offered through Oregon State University Extended Campus. For more information, contact:
Web: ecampus.oregonstate.edu   Email: ecampus@oregonstate.edu   Tel: 800-667-1465

Additionally, Canvas, the learning management system through which this course is offered, provides a vendor statement certifying how the platform is accessible to students with disabilities.

Expectations for Student Conduct
Student conduct is governed by the university's policies, as explained in the Student Conduct Code.

Academic Integrity
Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.

b) It includes:

(i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.

(ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.

(iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

(iv) TAMPERING - altering or interfering with evaluation instruments or documents.

(v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

Conduct in this Online Classroom
Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the [university's regulations regarding civility](#).

Tutoring
[NetTutor](#) is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Students connect to live tutors from any computer that has Internet access. NetTutor provides a virtual whiteboard that allows tutors and students to work on problems in a real time environment. They also have an online writing lab where tutors critique and return essays within 24 to 48 hours. Access NetTutor from within your Canvas class by clicking on the NetTutor button in your course menu.

OSU Student Evaluation of Teaching
Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the 19 multiple choice questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions via ONID by the Office of Academic Programs, Assessment, and Accreditation. You will log in to "Student Online Services" to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.