

## Term Information

Effective Term Summer 2021  
[Previous Value](#) [Autumn 2019](#)

## Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

Adding a 100% DL option.

What is the rationale for the proposed change(s)?

To give flexibility in how we offer some of our undergraduate major and minor courses.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area	Statistics
Fiscal Unit/Academic Org	Statistics - D0694
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	3202
Course Title	Introduction to Statistical Inference for Data Analytics
Transcript Abbreviation	Intr Stat Inf DA
Course Description	Foundational inferential methods for learning about populations from samples, including point and interval estimation, and the formulation and testing of hypotheses. Statistical theory is introduced to justify the approaches. The course emphasizes challenges that arise when applying classical ideas to big data, partially through the use of computational and simulation techniques.
Semester Credit Hours/Units	Fixed: 4

## Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
<a href="#">Previous Value</a>	<a href="#">No</a>
Grading Basis	Letter Grade
Repeatable	No
Course Components	Recitation, Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

## Prerequisites and Exclusions

Prerequisites/Corequisites  
Exclusions  
Electronically Enforced

Prereq: C- or better in 3201, or permission of instructor.  
Not open to students with credit for 4202.  
Yes

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code 27.0501  
Subsidy Level Baccalaureate Course  
Intended Rank Sophomore, Junior

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

## Course Details

Course goals or learning objectives/outcomes

- Describe the role of a parameter in a statistical model and its relationship to observed data
- Use data to estimate and describe uncertainty about the parameters of a statistical model
- Translate scientific hypotheses about a population into mathematical statements about parameters in a statistical model
- Formulate statistical procedures to test a hypothesis about parameters in a statistical model, and interpret the results in both statistical and application-specific terms
- Explain the difference between statistical and practical significance in massive data settings
- Appreciate the effect of missing data on statistical inference
- Evaluate and compare different statistical procedures for answering the same question

Content Topic List

- Statistical models and parameters
- Point and interval estimation
- Effects of missing data
- Formulating statistical hypotheses
- Tests for means, variances and proportions
- Interpreting and explaining the results of statistical tests
- Properties of hypothesis tests

Sought Concurrence

No

**COURSE CHANGE REQUEST**  
3202 - Status: PENDING

Last Updated: Haddad,Deborah Moore  
11/18/2020

**Attachments**

- Stat3202\_DLSyllabus\_AU21.docx: DL syllabus  
*(Syllabus. Owner: Craigmile,Peter F)*
- Stat3202\_InPersonSyllabus\_AU21.docx: In-person syllabus  
*(Syllabus. Owner: Craigmile,Peter F)*
- DL checklist Stat 3202.docx: ASC Tech DL checklist  
*(Other Supporting Documentation. Owner: Craigmile,Peter F)*

**Comments**

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Craigmile,Peter F	11/18/2020 01:04 PM	Submitted for Approval
Approved	Craigmile,Peter F	11/18/2020 01:21 PM	Unit Approval
Approved	Haddad,Deborah Moore	11/18/2020 03:36 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	11/18/2020 03:36 PM	ASCCAO Approval



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

# **SYLLABUS: STAT 3202 – DISTANCE LEARNING**

## **INTRODUCTION TO STATISTICAL INFERENCE FOR DATA ANALYTICS**

### **AUTUMN 2021**

## **Course overview**

### **Instructor**

Instructor: TBD

Email address: TBD

Office hours: Virtual Hours via Carmen Zoom, TBD

### **Grader or Teaching Assistant**

TBD

### **Course description**

Foundational inferential methods for learning about populations from samples, including point and interval estimation, and the formulation and testing of hypotheses. Statistical theory is introduced to justify the approaches. The course emphasizes challenges that arise when applying classical ideas to big data, partially through the use of computational and simulation techniques. Prereq: C- or better in 3201, or permission of instructor. Not open to students with credit for 4202.

### **Course learning outcomes**

By the end of this course, students should successfully be able to:

- Use the Central Limit Theorem to model the sample distribution of a sample mean
- Compare the performance of estimators via bias, mean squared error, consistency, and sufficiency
- Propose estimators via the method of moments and maximum likelihood estimation

- Use Monte Carlo simulation to model the performance of estimators and testing procedures
- Conduct hypothesis tests on mean and variance parameters,
- Determine and interpret the power and type-II error of a test
- Use bootstrapping to conduct inference
- Perform nonparametric hypothesis tests on mean parameters
- (Time permitting) Conduct and interpret Analysis of Variance
- (Time permitting) Define Bayesian statistics and investigate some simple problems involving inference on a proportion

## Course materials

### Required

Stat 3202 Course Notes (electronic, on Carmen)

### Optional (recommended) materials

*Mathematical Statistics with Applications, 7th edition*, by Wackerly, Mendenhall, and Scheaffer, Brooks/Cole, Cengage Learning, 2008. eBook PDFs are much cheaper and are highly encouraged.

## Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** [8help@osu.edu](mailto:8help@osu.edu)
- **TDD:** 614-688-8743

### Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

### Technology skills necessary for this specific course

- CarmenZoom
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

## Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 10+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

## Necessary software

- This class requires you to use the statistical software package called R (The R Project for Statistical Computing; <http://www.r-project.org/>). This software package is available as free.
  - You can download R for Windows, Mac, and Linux, from the CRAN archive at <https://cran.r-project.org>.
  - An in-depth introduction to R is available at <http://cran.r-project.org/doc/manuals/R-intro.pdf>
  - Hands-on tutorials are available in the Swirl system, which you can learn about at <http://swirlstats.com/>. In particular, “R Programming: The basics of programming in R” is an appropriate first tutorial for students who have never used R.
- An easier to use interface to R is available in the software package RStudio. This package is available for Windows, Mac, and Linux and can be downloaded for free from <http://rstudio.org>. **Note that RStudio requires R to be installed.**
- [Microsoft Office 365 ProPlus](#) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft’s Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
  - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
  - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

## Course Delivery – Distance Learning

Each week two lecture videos, totaling approximately 165 minutes of lecture, will be posted on the course website. You are responsible for watching the videos and studying the material that is assigned each week. A lecture check assignment must be completed after each lecture so please keep on schedule with the content. These videos will be recorded at a consistent time each week so that students who wish may watch the content synchronously.

Additionally, one lab tutorial video will be posted most weeks, excluding weeks with a project or exam. The lab tutorial videos are meant to supplement the weekly lab assignments that implement our theoretical statistical topics with simulation-based problems and data analysis problems. Exams and assessments will be held remotely. All submissions, such as homework assignments, will be virtual through Carmen.

## Grading and faculty response

### Grades

Assignment or category	Percentage
Homeworks	20%
Labs	20%
Lecture checks	20%
Exam 1	10%
Exam 2	10%
Final project	20%
<b>Total</b>	<b>100%</b>

### Assignment Information

**Lecture Checks:** after each lecture, you are responsible for completing a brief lecture check assignment covering that lecture's materials. Typically, lecture checks will take 10-15 minutes. Lecture checks should be completed before 11:59 pm the next day. You are encouraged to collaborate remotely on lecture check assignments, but ultimately the work you submit must be your own.

**Homeworks:** tentatively, there will be seven homework assignments. Assignments should be submitted to Carmen as a .pdf file and organized according to the homework template. Every assigned problem should be completed, but only a subset of problems may be graded. You are encouraged to collaborate remotely on homework assignments, but ultimately the work you submit must be your own.

**Labs:** each week a lab assignment will incorporate the recent topics with coding. Labs will be due Fridays before 11:59 pm. You are encouraged to collaborate remotely on lab assignments, but ultimately the work you submit must be your own.

**Exams/assessments:** You must work independently on exams. You may not solicit help from other students or other online resources.

## Late Assignments

In general, late assignments will only be accepted at the instructor's discretion with a 10% deduction for each day past the deadline. The sooner I know of a potential problem, the better. If something is going to prevent you from submitting an assignment on-time, please reach out immediately.

## Grading Scale

93–100: A  
90–92.9: A-  
87–89.9: B+  
83–86.9: B  
80–82.9: B-  
77–79.9: C+  
73–76.9: C  
70–72.9: C-  
67–69.9: D+  
60–66.9: D  
Below 60: E

## Faculty feedback and response time

I will make reasonable efforts to provide feedback in a timely manner.

Grading and feedback: For large weekly assignments, you can generally expect feedback within 7 days.

Email: I will reply to e-mails within **24 hours on school days**.

Discussions: I will check and reply to messages in the discussion boards every **24 hours on school days**.



# Attendance, participation, and discussions

## Student participation requirements

Because this is a distance learning course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in: at least three times per week**  
Be sure you are logging in to the course in Carmen at least three times each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) **If you have a situation that might cause you to miss an extended period of class, discuss it with me *as soon as possible*.**
- **Office hours and live sessions: optional/flexible**  
All live, scheduled events for the course, including my office hours, are optional. For live presentations, I will provide a recording that you can watch later. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.

## Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** Please remember to use appropriate grammar, spelling, and punctuation. Your written comments on Carmen discussions are visible to all students, and emails are visible to me, so please make efforts to communicate professionally.
- **Tone and civility:** Please maintain a supportive learning community where everyone feels safe and where people can disagree amicably.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then pasting into the Carmen discussion.

## Other course policies

### Health and safety (to be updated as necessary for Autumn 2021 health guidelines)

The Ohio State University Wexner Medical Center's Coronavirus Outbreak site (<https://wexnermedical.osu.edu/features/coronavirus>) includes the latest information about COVID-19 as well as guidance for students, faculty and staff.

Guidelines and requirements for campus safety from the University's COVID-19 Transition Task Force were published on July 1 on the Safe and Healthy website (<https://safeandhealthy.osu.edu>). They include the following:

- “A daily health check to report body temperature and health status will be required for all faculty, staff and students each day they intend to be on Ohio State’s campuses in the autumn.”
- Face masks must be worn in indoor settings, including classrooms. Noncompliant students will be asked to leave. I will have no patience whatsoever with students who put myself and others at risk.
- Members of the campus community will be required to sign a pledge “to affirm their understanding of what is needed to help fight the spread of the virus and their intention to do their part.”
- “Accountability measures will be in place for those who refuse to abide by required health and safety guidelines.”

## Potential disruptions to instruction

In the event you are unable to participate for an extended period of time, please reach out to me as soon as possible. If it is reasonable for you to continue participating remotely, all materials will remain accessible for you.

In the event I am unable to participate for an extended period of time, I will let students know as soon as possible. A replacement instructor will be available through the Department of Statistics.

## Student academic services

Student academic services offered on the OSU main campus  
<http://advising.osu.edu/welcome.shtml>.

## Student support services

Student support services offered on the OSU main campus <http://ssc.osu.edu>.

## Academic integrity policy

### Policies for this online course

- **Lecture checks:** You are encouraged to collaborate remotely on lecture check assignments, but ultimately the work you submit must be your own.
- **Labs:** You are encouraged to collaborate remotely on lab assignments, but ultimately the work you submit must be your own.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on an exam is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

### Ohio State's academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

## Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

## Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been

sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at [titleix@osu.edu](mailto:titleix@osu.edu)

## **Accessibility accommodations for students with disabilities**

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

### **Accessibility of course technology**

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

## **Your mental health**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

## Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

## Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments
1	Aug 23 – Aug 27	<p><b>Optional foundation material: summations and products, derivatives and differentiation, exponent and logarithm rules, indefinite integrals</b></p> <p><b>Week 1 Content:</b>  <b>Statistics vocabulary, expectation and variance, frequently used probability distributions, assessing normality</b></p> <p><b>Week 1 Assignments:</b>  <b>Lecture Checks: 1A and 1B</b>  <b>Lab 1: R Markdown introduction</b></p>
2	Aug 30 – Sep 3	<p><b>Week 2 Content:</b>  <b>Frequently used statistics, Monte Carlo simulation, custom R functions, sampling distributions, the Central Limit Theorem</b></p> <p><b>Week 2 Assignments:</b>  <b>Lecture Checks 2A and 2B</b>  <b>Lab 2: Monte Carlo and custom R functions</b>  <b>Homework 1</b></p>
3	Sep 6 – Sep 10	<p><b>Week 3 Content:</b>  <b>Estimators, bias, mean squared error</b></p> <p><b>Week 3 Assignments:</b>  <b>Lecture Checks 3A and 3B</b></p>

		<b>Lab 3: sampling distributions from MC; CLT illustration due</b>
<b>4</b>	<b>Sep 13 – Sep 17</b>	<b>Week 4 topics: consistency</b> <b>Week 4 Assignments:</b> <b>Lecture Checks 4A and 4B</b> <b>Homework 2</b> <b>Lab 4: bias and MSE</b>
<b>5</b>	<b>Sep 20 – Sep 24</b>	<b>Week 5 topics: likelihood and sufficiency</b> <b>Week 5 Assignments:</b> <b>Lecture Checks 5A and 5B</b> <b>Lab 5: consistency</b>
<b>6</b>	<b>Sep 27 – Oct 1</b>	<b>Week 6 topics: method of moments</b> <b>Week 6 Assignments:</b> <b>Lecture Checks 6A and 6B</b> <b>Lab 6: working with likelihood functions</b> <b>Homework 3</b>
<b>7</b>	<b>Oct 4 – Oct 8</b>	<b>Week 7 topics: maximum likelihood estimation</b> <b>Week 7 Assignments:</b> <b>Lecture Checks 7A and 7B</b> <b>Lab 7: Comparing estimators (bias, MSE, consistency review)</b>
<b>8</b>	<b>Oct 11 – Oct 15</b>	<b>Week 8 topics: Hypothesis testing and hypothesis tests on a single mean, paired tests</b> <b>Week 8 Assignments:</b> <b>Lecture Checks 8A and 8B</b> <b>Lab 8: maximum likelihood</b> <b>Homework 4</b>
<b>9</b>	<b>Oct 18 – Oct 22</b>	<b>Week 9 topics: hypothesis tests on a difference of means, hypothesis tests on proportions</b> <b>Week 9 Assignments:</b> <b>Lecture Checks 9A and 9B</b> <b>Lab 9: power and type-I error in hypothesis tests on a mean</b>

10	Oct 25 – Oct 29	<p><b>Week 10 topics: hypothesis tests on a single variance; hypothesis tests on two variances</b></p> <p><b>Week 10 Assignments:</b></p> <p><b>Lecture Checks 10A and 10B</b></p> <p><b>Lab 10: power and type-I error in hypothesis tests on differences of means and proportions</b></p> <p><b>Homework 5</b></p>
11	Nov 1 – Nov 5	<p><b>Week 11 topics: power and type-II error</b></p> <p><b>Week 11 Assignments:</b></p> <p><b>Lecture checks 11A and 11B</b></p> <p><b>Lab 11: power and type-I error summary</b></p>
12	Nov 8 – Nov 12	<p><b>Week 12 topics: Bootstrapping</b></p> <p><b>Week 12 assignments:</b></p> <p><b>Lecture checks 12A and 12B</b></p> <p><b>Lab 12: bootstrapping</b></p> <p><b>Homework 6</b></p>
13	Nov 15 – Nov 19	<p><b>Week 13 topics: Nonparametric tests, Wilcoxon Signed-Rank test, Mann-Whitney U test; read course notes TBD; read Wackerly and Mendenhall TBD</b></p> <p><b>Week 13 assignments:</b></p> <p><b>Lecture checks 13A and 13B</b></p> <p><b>Lab 13: nonparametric tests</b></p>
14	Nov 22 – Nov 26	<p><b>Week 14 topic: Analysis of Variance</b></p> <p><b>Week 14 assignments:</b></p> <p><b>Lecture check 14A</b></p> <p><b>Lab 14: ANOVA</b></p>
15	Nov 29 – Dec 3	<p><b>Week 15 topics: Bayesian statistics</b></p> <p><b>Lecture check 15A and 15B</b></p> <p><b>Lab 15: Bayesian statistics</b></p> <p><b>Homework 7</b></p>

<b>Finals</b>		<b>Final Exam date TBD</b>
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THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

# SYLLABUS: STAT 3202 – IN-PERSON LEARNING

## INTRODUCTION TO STATISTICAL INFERENCE FOR DATA ANALYTICS

### AUTUMN 2021

## Course overview

### Instructor

Instructor: TBD

Email address: TBD

Office hours: Virtual Hours via Carmen Zoom, TBD

### Grader or Teaching Assistant

TBD

### Course description

Foundational inferential methods for learning about populations from samples, including point and interval estimation, and the formulation and testing of hypotheses. Statistical theory is introduced to justify the approaches. The course emphasizes challenges that arise when applying classical ideas to big data, partially through the use of computational and simulation techniques. Prereq: C- or better in 3201, or permission of instructor. Not open to students with credit for 4202.

### Course learning outcomes

By the end of this course, students should successfully be able to:

- Use the Central Limit Theorem to model the sample distribution of a sample mean
- Compare the performance of estimators via bias, mean squared error, consistency, and sufficiency
- Propose estimators via the method of moments and maximum likelihood estimation

- Use Monte Carlo simulation to model the performance of estimators and testing procedures
- Conduct hypothesis tests on mean and variance parameters,
- Determine and interpret the power and type-II error of a test
- Use bootstrapping to conduct inference
- Perform nonparametric hypothesis tests on mean parameters
- (Time permitting) Conduct and interpret Analysis of Variance
- (Time permitting) Define Bayesian statistics and investigate some simple problems involving inference on a proportion

## Course materials

### Required

Stat 3202 Course Notes (electronic, on Carmen)

### Optional (recommended) materials

*Mathematical Statistics with Applications, 7th edition*, by Wackerly, Mendenhall, and Scheaffer, Brooks/Cole, Cengage Learning, 2008. eBook PDFs are much cheaper and are highly encouraged.

## Course technology

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- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
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### Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
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### Technology skills necessary for this specific course

- CarmenZoom (optional for Zoom office hours)

## Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 10+) with high-speed internet connection
- Microphone: built-in laptop or tablet mic or external microphone (optional for Zoom office hours)

## Necessary software

- This class requires you to use the statistical software package called R (The R Project for Statistical Computing; <http://www.r-project.org/>). This software package is available as free.
  - You can download R for Windows, Mac, and Linux, from the CRAN archive at <https://cran.r-project.org>.
  - An in-depth introduction to R is available at <http://cran.r-project.org/doc/manuals/R-intro.pdf>
  - Hands-on tutorials are available in the Swirl system, which you can learn about at <http://swirlstats.com/>. In particular, “R Programming: The basics of programming in R” is an appropriate first tutorial for students who have never used R.
- An easier to use interface to R is available in the software package RStudio. This package is available for Windows, Mac, and Linux and can be downloaded for free from <http://rstudio.org>. **Note that RStudio requires R to be installed.**
- [Microsoft Office 365 ProPlus](#) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft’s Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
  - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
  - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

## Course Delivery – In-Person Learning

This course meets twice weekly. Each meeting is one hour and 20 minutes. Lecture attendance is mandatory. To check understanding, assignments will occasionally be given in class or lecture check assignments will be given occasionally after lectures.

Lab tutorials and supplemental problems will be provided during recitation times. Lab assignments will be due at the end of each week.

All submissions, such as homework assignments, will be virtual through Carmen.

## Grading and faculty response

### Grades

Assignment or category	Percentage
Homeworks	15%
Labs	15%
In-class assignments/Lecture checks	20%
Exam 1	15%
Exam 2	15%
Final Exam	20%
<b>Total</b>	<b>100%</b>

### Assignment Information

**In-Class assignments/Lecture checks:** short graded assignments will occasionally be given during lectures. Carmen-based lecture checks will also be assigned from time to time. The goal of these assignments is to give you practice, ensure you are staying up to date with course content, and to give me a chance to quickly address any misconceptions .

**Homeworks:** tentatively, there will be seven homework assignments. Assignments should be submitted to Carmen as a .pdf file and organized according to the homework template. Every assigned problem should be completed, but only a subset of problems may be graded. You are encouraged to collaborate remotely on homework assignments, but ultimately the work you submit must be your own.

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**Exams/assessments:** Exams will take place in-person at times and locations to be determined.

## Late Assignments

In general, late assignments will only be accepted at the instructor's discretion with a 10% deduction for each day past the deadline. The sooner I know of a potential problem, the better. If something is going to prevent you from submitting an assignment on-time, please reach out immediately.

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77–79.9: C+  
73–76.9: C  
70–72.9: C-  
67–69.9: D+  
60–66.9: D  
Below 60: E

## Faculty feedback and response time

I will make reasonable efforts to provide feedback in a timely manner.

Grading and feedback: For large weekly assignments, you can generally expect feedback within 7 days.

Email: I will reply to e-mails within **24 hours on school days**.

Discussions: I will check and reply to messages in the discussion boards every **24 hours on school days**.

# Attendance, participation, and discussions

## Student participation requirements

Students are expected to attend every lecture and every recitation. Because Ohio State does not have a universal student absence policy, absences will be considered on a case by case basis. Your case may be strengthened with documentation such as doctor's notes, OSU athletics schedules, court summons, advance notice, and strong prior attendance. In the event of an excused and missed in-class assignment, recitation assignment, or exam, it is the student's responsibility to schedule a mutually agreeable time with their TA or professor to complete the assignment. Just because a student is absent does not guarantee they will be given an opportunity to make up an assignment.

## Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** Please remember to use appropriate grammar, spelling, and punctuation. Your written comments on Carmen discussions are visible to all students, and emails are visible to me, so please make efforts to communicate professionally.
- **Tone and civility:** Please maintain a supportive learning community where everyone feels safe and where people can disagree amicably.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then pasting into the Carmen discussion.

## Other course policies

### Health and safety (to be updated as necessary for Autumn 2021 health guidelines)

The Ohio State University Wexner Medical Center's Coronavirus Outbreak site (<https://wexnermedical.osu.edu/features/coronavirus>) includes the latest information about COVID-19 as well as guidance for students, faculty and staff.

Guidelines and requirements for campus safety from the University's COVID-19 Transition Task Force were published on July 1 on the Safe and Healthy website (<https://safeandhealthy.osu.edu>). They include the following:

- “A daily health check to report body temperature and health status will be required for all faculty, staff and students each day they intend to be on Ohio State’s campuses in the autumn.”
- Face masks must be worn in indoor settings, including classrooms. Noncompliant students will be asked to leave. I will have no patience whatsoever with students who put myself and others at risk.
- Members of the campus community will be required to sign a pledge “to affirm their understanding of what is needed to help fight the spread of the virus and their intention to do their part.”
- “Accountability measures will be in place for those who refuse to abide by required health and safety guidelines.”

## Potential disruptions to instruction

In the event you are unable to attend class for an extended period of time, please reach out to me as soon as possible. If it is reasonable for you to continue participating remotely, all materials will remain accessible for you.

In the event I am unable to participate for an extended period of time, I will let students know as soon as possible. A replacement instructor will be available through the Department of Statistics.

## Student academic services

Student academic services offered on the OSU main campus  
<http://advising.osu.edu/welcome.shtml>.

## Student support services

Student support services offered on the OSU main campus <http://ssc.osu.edu>.

## Academic integrity policy

### Policies for this online course

- **Lecture checks:** You are encouraged to collaborate remotely on lecture check assignments, but ultimately the work you submit must be your own.
- **Labs:** You are encouraged to collaborate remotely on lab assignments, but ultimately the work you submit must be your own.

- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on an exam is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

### Ohio State's academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

### Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

### Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at [titleix@osu.edu](mailto:titleix@osu.edu)



## Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

### Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

## Your mental health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

## Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

## Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments
1	Aug 23 – Aug 27	<p><b>Optional foundation material: summations and products, derivatives and differentiation, exponent and logarithm rules, indefinite integrals</b></p> <p><b>Week 1 Content:</b>  <b>Statistics vocabulary, expectation and variance, frequently used probability distributions, assessing normality</b></p> <p><b>Week 1 Assignments:</b>  <b>Lecture Checks: 1A and 1B</b>  <b>Lab 1: R Markdown introduction</b></p>
2	Aug 30 – Sep 3	<p><b>Week 2 Content:</b>  <b>Frequently used statistics, Monte Carlo simulation, custom R functions, sampling distributions, the Central Limit Theorem</b></p> <p><b>Week 2 Assignments:</b>  <b>Lecture Checks 2A and 2B</b>  <b>Lab 2: Monte Carlo and custom R functions</b>  <b>Homework 1</b></p>
3	Sep 6 – Sep 10	<p><b>Week 3 Content:</b>  <b>Estimators, bias, mean squared error</b></p> <p><b>Week 3 Assignments:</b>  <b>Lecture Checks 3A and 3B</b></p>

		<b>Lab 3: sampling distributions from MC; CLT illustration due</b>
<b>4</b>	<b>Sep 13 – Sep 17</b>	<b>Week 4 topics: consistency</b> <b>Week 4 Assignments:</b> <b>Lecture Checks 4A and 4B</b> <b>Homework 2</b> <b>Lab 4: bias and MSE</b>
<b>5</b>	<b>Sep 20 – Sep 24</b>	<b>Week 5 topics: likelihood and sufficiency</b> <b>Week 5 Assignments:</b> <b>Lecture Checks 5A and 5B</b> <b>Lab 5: consistency</b>
<b>6</b>	<b>Sep 27 – Oct 1</b>	<b>Week 6 topics: method of moments</b> <b>Week 6 Assignments:</b> <b>Lecture Checks 6A and 6B</b> <b>Lab 6: working with likelihood functions</b> <b>Homework 3</b>
<b>7</b>	<b>Oct 4 – Oct 8</b>	<b>Week 7 topics: maximum likelihood estimation</b> <b>Week 7 Assignments:</b> <b>Lecture Checks 7A and 7B</b> <b>Lab 7: Comparing estimators (bias, MSE, consistency review)</b>
<b>8</b>	<b>Oct 11 – Oct 15</b>	<b>Week 8 topics: Hypothesis testing and hypothesis tests on a single mean, paired tests</b> <b>Week 8 Assignments:</b> <b>Lecture Checks 8A and 8B</b> <b>Lab 8: maximum likelihood</b> <b>Homework 4</b>
<b>9</b>	<b>Oct 18 – Oct 22</b>	<b>Week 9 topics: hypothesis tests on a difference of means, hypothesis tests on proportions</b> <b>Week 9 Assignments:</b> <b>Lecture Checks 9A and 9B</b> <b>Lab 9: power and type-I error in hypothesis tests on a mean</b>

10	Oct 25 – Oct 29	<p><b>Week 10 topics: hypothesis tests on a single variance; hypothesis tests on two variances</b></p> <p><b>Week 10 Assignments:</b></p> <p><b>Lecture Checks 10A and 10B</b></p> <p><b>Lab 10: power and type-I error in hypothesis tests on differences of means and proportions</b></p> <p><b>Homework 5</b></p>
11	Nov 1 – Nov 5	<p><b>Week 11 topics: power and type-II error</b></p> <p><b>Week 11 Assignments:</b></p> <p><b>Lecture checks 11A and 11B</b></p> <p><b>Lab 11: power and type-I error summary</b></p>
12	Nov 8 – Nov 12	<p><b>Week 12 topics: Bootstrapping</b></p> <p><b>Week 12 assignments:</b></p> <p><b>Lecture checks 12A and 12B</b></p> <p><b>Lab 12: bootstrapping</b></p> <p><b>Homework 6</b></p>
13	Nov 15 – Nov 19	<p><b>Week 13 topics: Nonparametric tests, Wilcoxon Signed-Rank test, Mann-Whitney U test; read course notes TBD; read Wackerly and Mendenhall TBD</b></p> <p><b>Week 13 assignments:</b></p> <p><b>Lecture checks 13A and 13B</b></p> <p><b>Lab 13: nonparametric tests</b></p>
14	Nov 22 – Nov 26	<p><b>Week 14 topic: Analysis of Variance</b></p> <p><b>Week 14 assignments:</b></p> <p><b>Lecture check 14A</b></p> <p><b>Lab 14: ANOVA</b></p>
15	Nov 29 – Dec 3	<p><b>Week 15 topics: Bayesian statistics</b></p> <p><b>Lecture check 15A and 15B</b></p> <p><b>Lab 15: Bayesian statistics</b></p> <p><b>Homework 7</b></p>

<b>Finals</b>		<b>Final Exam date TBD</b>
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## Arts and Sciences Distance Learning Course Component Technical Review Checklist

**Course: STAT 3202**

**Instructor: TBD**

**Summary: Introduction to Statistical Inference for Data Analytics**

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/ Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			<ul style="list-style-type: none"> <li>Carmen</li> <li>Office 365</li> <li>R Software</li> </ul>
6.2 Course tools promote learner engagement and active learning.	X			<ul style="list-style-type: none"> <li>Zoom lectures</li> <li>Carmen Discussion boards</li> </ul>
6.3 Technologies required in the course are readily obtainable.	X			All are available within Carmen which is free to use.
6.4 The course technologies are current.	X			All items are updated regularly.
6.5 Links are provided to privacy policies for all external tools required in the course.	X			All available privacy policies are included.
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			Links to 8HELP are provided, as is a link to R software support.
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.	X			b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	X			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.	X			All available accessibility policies are included.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			
8.4 The course design facilitates readability	X			
8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser

### Reviewer Information

- Date reviewed: 11/17/20
- Reviewed by: Ian Anderson

**Notes: Good to go!**

<sup>a</sup>The following statement about disability services (recommended 16 point font):  
Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, [slds@osu.edu](mailto:slds@osu.edu); [slds.osu.edu](http://slds.osu.edu).

<sup>b</sup>Add to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus.  
<http://advising.osu.edu/welcome.shtml>

<sup>c</sup>Add to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the “Other Course Policies” section of the syllabus.