

## Term Information

Effective Term Autumn 2020  
[Previous Value](#) [Autumn 2015](#)

## Course Change Information

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

We would like the option to offer this course as a distance learning course. This is a hybrid course as the exams will be taken on campus.

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

This gives us the option to alter the method of delivery for this course.

**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	3470
Course Title	Introduction to Probability and Statistics for Engineers
Transcript Abbreviation	Intro Stat Eng
Course Description	Introduction to probability, Bayes theorem; discrete and continuous random variables, expected value, probability distributions; point and interval estimation; hypotheses tests for means and proportions; least squares regression.
Semester Credit Hours/Units	Fixed: 3

## Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 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 Greater or equal to 50% at a distance Less than 50% at a distance

[Previous Value](#) [No](#)

Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never

Campus of Offering

Columbus, Lima, Marion

## **Prerequisites and Exclusions**

**Prerequisites/Corequisites**

Prereq: Math 1152, 1161.xx, 1172, 1181H, 153 or 254, or equiv, or permission of instructor.

**Exclusions**

Not open to students with credit for 3450, 3460, 427, or 428.

**Electronically Enforced**

No

## **Cross-Listings**

Cross-Listings

## **Subject/CIP Code**

**Subject/CIP Code**

27.0501

**Subsidy Level**

Baccalaureate Course

**Intended Rank**

Sophomore, Junior, Senior

## **Requirement/Elective Designation**

General Education course:

Data Analysis

The course is an elective (for this or other units) or is a service course for other units

## **Course Details**

**Course goals or learning objectives/outcomes**

- Upon successful completion of this course, students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

***Previous Value***

- *This will be supplied after departmental review of all course goals.*

**Content Topic List**

- Introduction to probability
- Bayes theorem
- Discrete and continuous random variables
- Expected value
- Probability distributions
- Point and interval estimation
- Hypotheses tests for means and proportions
- Least squares regression

**Sought Concurrence**

No

## Attachments

- 3470Syllabus\_InPerson.docx: In person version  
*(Syllabus. Owner: Craigmile,Peter F)*
- 3470Syllabus\_Online.docx: Online version  
*(Syllabus. Owner: Craigmile,Peter F)*
- Statistics\_3470\_outcomes\_assessment.doc  
*(GEC Course Assessment Plan. Owner: Craigmile,Peter F)*
- Stat 3470\_ASC\_DL.pdf: ASC Tech DL assessment  
*(Other Supporting Documentation. Owner: Craigmile,Peter F)*
- Petition.pdf: Petition to the Registrar  
*(Appeal. Owner: Craigmile,Peter F)*

## Comments

- The petition is attached. *(by Craigmile,Peter F on 02/10/2020 01:30 PM)*
- 02.10.20: The deadline for AU20 course changes had been Feb 1. Please change the effective date to SP21.  
Alternatively, you might try attaching a petition to the Registrar requesting an exception. *(by Haddad,Deborah Moore on 02/10/2020 01:02 PM)*

## Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Craigmile,Peter F	02/10/2020 12:39 PM	Submitted for Approval
Approved	Craigmile,Peter F	02/10/2020 12:40 PM	Unit Approval
Revision Requested	Haddad,Deborah Moore	02/10/2020 01:02 PM	College Approval
Submitted	Craigmile,Peter F	02/10/2020 01:30 PM	Submitted for Approval
Approved	Craigmile,Peter F	02/10/2020 01:30 PM	Unit Approval
Approved	Haddad,Deborah Moore	02/10/2020 01:32 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	02/10/2020 01:32 PM	ASCCAO Approval



THE OHIO STATE UNIVERSITY

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**Department of Statistics**

404 Cockins Hall  
1958 Neil Avenue  
Columbus, OH 43210

**Peter F. Craigmile, Ph.D.**

*Professor*  
614-292-0291  
pfc@stat.osu.edu

February 10, 2020

Dear Registrar,

I am writing to petition that the two course change forms for Stat 3470 and Stat 5740 be considered for approval in Autumn 2020. Both of these course changes ensure that we are able to offer the courses at a distance and be more adaptive to the needs of our students.

We know that we are past the February 1 deadline, but it has taken time to correspond with all the relevant parties, including ASC Tech, to get approval for these courses.

Sincerely,

Peter F. Craigmile, Ph.D.

Professor of Statistics



# SYLLABUS:

## STAT 3470 – INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS (IN PERSON)

### Course overview

#### Instructors

To be determined

**Office hours:** Days and times TBD or by appointment.

#### Teaching Assistants

To be determined

#### Course description

The course is an introduction to probability and statistics for engineers. Topics covered include probability, Bayes Theorem, discrete and continuous random variables, probability distributions, expected values, sampling distributions, point estimation, confidence intervals, hypothesis testing and least squares regression models. A more detailed list of topics can be found in the tentative schedule below.

#### Course learning outcomes

**General Education (GE) Requirement:** This course satisfies the GE requirement in Data Analysis.

**Expected Learning Outcomes:** Upon successful completion of this course, students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

## Course materials

Probability and Statistics for Engineering and the Sciences (9th edition), by Jay Devore.

The electronic version of this textbook and the accompanying homework management system **WebAssign** are offered through CarmenBooks.

<https://affordablelearning.osu.edu/carmenbooks/students>

## Assessment

**Homework:** There will be weekly homework assignments via WebAssign. The assignments will be completed and submitted online, through the WebAssign interface.

**Exams:** There will be two midterm exams and one final exam. **All exams will be in-person** at a location and time to be determined and communicated later. The first midterm exam will take place roughly after 5 weeks of classes and the second midterm exam will take place roughly 5 weeks after the first midterm. The final exam will take place at the time and date established by the University.

Homework will count for 20% of the final grade, each midterm exam will count for 25% of the grade and the final exam will count for 30% of the final grade.

## Course schedule

The following is a tentative weekly list of topics which will be covered during this course:

(Dates will be added when the course is offered.)

Week	Topic
1	Introduction, sample spaces, counting, probability
2	Independence, random variables, probability distributions, expectation
3	Binomial, Poisson probability distributions.
4	Pdfs, Cdfs, the Normal distribution
5	Exponential, Gamma distributions, joint probability distributions.
6	Stacking (Concatenating), Merging and Restructuring Data Sets
7	Statistics, sampling distributions
8	Point estimation
9	Confidence intervals
10	Confidence intervals
11	Hypothesis testing
12	Hypothesis testing
13	Simple linear regression
14	Model checking, transformations
15	Multiple regression

## 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>, 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; the following website may help you if you encounter difficulties with Carmen: <https://resourcecenter.odee.osu.edu/canvas/>.

## Necessary equipment

- Computer: current Mac (macOS) or PC (Windows 7+) with high-speed internet connection and an up-to-date browser. A number of publicly available computers are available on campus, here is a link for their locations <https://odee.osu.edu/public-computing>.
- CarmenZoom text, audio, and video chat. If you need technical assistance, either call 614-688-HELP, or refer to the online instructions: <https://resourcecenter.odee.osu.edu/carmenzoom>



# Staff response

## Staff feedback and response time

We are providing the following list to give you an idea of our intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

### Canvas Conversations

A course instructor or teaching assistant will reply to messages sent via Canvas Conversations within **24 hours on school days (Monday – Friday, excluding university holidays; list of holidays at <http://registrar.osu.edu/staff/bigcal.asp>)**.

### Discussion board

We will check and reply to messages in the discussion boards as appropriate every **24 hours on school days**.

**If you have questions about the Mastery Assessments (Quizzes) or notice any typos in the material, please message us directly via Canvas Conversations – please do not use the Discussion board.**

# Attendance, participation, and discussions

## Communication guidelines

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

- **Writing style:** While there is no need to communicate as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

# Other course policies

## Academic integrity policy

### Policies for this online course

- **Assessments:** You must complete the assessments yourself, without any external help or communication. Exercises are included as self-checks without points attached.

### Ohio State's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so we recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

**If we suspect that a student has committed academic misconduct in this course, we are obligated by University Rules to report my suspicions to the Committee on Academic Misconduct.** If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages (<http://oaa.osu.edu/coam.html>)
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- *Eight Cardinal Rules of Academic Integrity* (<http://www.northwestern.edu/uacc/8cards.htm>)

## Advising

For help navigating this large university, you will find that you need advising. In addition, advisors can help you get information regarding accessing course materials to meet the needs of diverse learners. For more information, visit the university's advising website at <https://advising.osu.edu/>. In addition to advising services, OSU main campus students may find assistance at <http://ssc.osu.edu>.

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## Accessibility accommodations for students with disabilities

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).

### 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 (<https://community.canvaslms.com/docs/DOC-2061>)
- Streaming audio and video



# SYLLABUS:

## STAT 3470 – INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS (ONLINE)

### Course overview

#### Instructors

To be determined

**Office hours:** Days and times TBD, or by appointment. Office hours will be held on CarmenZoom (<https://osu.zoom.us>)

#### Teaching Assistants

To be determined

#### Course description

The course is an introduction to probability and statistics for engineers. Topics covered include probability, Bayes Theorem, discrete and continuous random variables, probability distributions, expected values, sampling distributions, point estimation, confidence intervals, hypothesis testing and least squares regression models. A more detailed list of topics can be found in the tentative schedule below.

#### Course learning outcomes

**General Education (GE) Requirement:** This course satisfies the GE requirement in Data Analysis.

**Expected Learning Outcomes:** Upon successful completion of this course, students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

## Course materials

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## Online Course Delivery

Each week one or more lecture videos will be posted on the course website. Each video will be approximately 15 minutes in length. You are responsible for watching the videos and studying the material that is assigned each week. In addition to the lecture videos, weekly assignments will be posted on the class website. You will be given between 5 and 7 days to complete the assignment.

## Assessment

**Homework:** There will be weekly homework assignments via WebAssign. The assignments will be completed and submitted online, through the WebAssign interface.

**Exams:** There will be two midterm exams and one final exam. **All exams will be in-person** at a location and time to be determined and communicated later. The first midterm exam will take place roughly after 5 weeks of classes and the second midterm exam will take place roughly 5 weeks after the first midterm. The final exam will take place at the time and date established by the University.

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## **Learning outcomes and assessment plan for Statistics 3470: Introduction to Probability and Statistics for Engineers**

**Expected Learning Outcomes Data Analysis:** Students develop skills in drawing conclusions and critically evaluating results based on data.

### **Expected Learning Outcomes:**

1. Students understand basic concepts of statistics and probability.
2. Students comprehend methods needed to analyze and critically evaluate statistical arguments.
3. Students recognize the importance of statistical ideas.

#### *1. How do the course objectives address the GE category expected learning outcomes?*

Students in Statistics 3470 are expected to be able to identify an appropriate analysis for data collected in a study, carry out such an analysis, examine whether the assumptions behind the analysis are reasonable, and recognize the strengths or weaknesses of the study based on how the data were collected. Doing so requires understanding basic concepts in statistics and probability; the ability to create graphical and numerical summaries of data; understanding how the design of a study affects the conclusions that can be made; and the ability to carry out basic statistical analyses.

#### *2. How do the readings assigned address the GE category expected learning outcomes?*

Readings are from the textbook and cover all the topics listed in the course. See the discussion in the next item regarding how these topics will address the GE category expected learning outcomes.

#### *3. How do the topics address the GE category expected learning outcomes?*

Course topics include probability (thus introducing students to basic concepts in probability); sampling distributions and statistical inference (thus introducing students to basic concepts in statistics); graphical and numerical summaries of data, design of experiments and sampling designs, and statistical inference (thus helping students critically evaluate statistical arguments); and one-sample procedures, two-sample procedures, and regression analysis (thus providing students with tools to analyze data).

#### *4. How do the written assignments address the GE category expected learning outcomes?*

The written assignments will include problems (from the textbook) on material from all the course topics. The problems will serve to provide practice in creating graphical and numerical displays (using statistical software); evaluating the quality of graphical

displays, designing simple studies and assess the quality of a design used in a study (both experimental and sampling designs); understanding the rules of probability including calculating probabilities in simple settings; understanding the notion of sampling distributions and calculating simple probabilities for sample means and proportions based on the sampling distributions; analyzing data in a variety of settings as well as checking the assumptions behind the analyses (using statistical software).

### **Course assessment plan:**

1. Students will conduct analyses of data throughout the quarter on both homework assignments and exams. Students will be required to discuss and interpret the results and the limitations of their analysis in both cases (using “plain English”). This will require mastery of the expected learning outcomes and will provide an assessment of the extent to which the class appears to have mastered the expected learning outcomes.
2. Final exams will contain embedded questions that address the learning outcomes. Using the same, or very similar, questions each time the course is taught will provide a consistent evaluation over time. Embedded questions will not appear in copies of past final exams and their solutions that are posted for student use. The embedded questions will either come from or be modeled on the Assessment Resource Tools for Improving Statistical Thinking (ARTIST) available online at [www.causeweb.org/research/](http://www.causeweb.org/research/). These are validated test questions and measurement tools to use in assessing statistical thinking.
3. A departmental committee will review the syllabus and direct assessment results regularly to make sure that it continues to address learning outcomes for the data analysis component of the GE.

GE Expected Learning Outcomes	Methods of Assessment	Level of student achievement expected for the GE ELO.	What is the process that will be used to review the data and potentially change the course to improve student learning of GE ELOs?
	*Direct methods are required. Additional indirect methods are encouraged.	(for example, define percentage of students achieving a specified level on a scoring rubric)	
ELO 1  Students understand basic concepts of statistics and probability.	Embedded exam questions	Our goal is for 80% of the students in the course to answer items correctly; we consider this to be above average performance and to demonstrate successful achievement of the ELO.	A departmental committee will review the syllabus and direct assessment results regularly to make sure that it continues to address learning outcomes for the data analysis component of the GE.
ELO 2  Students comprehend methods needed to analyze and critically evaluate statistical arguments.	Embedded exam questions	Our goal is for 80% of the students in the course to answer items correctly; we consider this to be above average performance and to demonstrate successful achievement of the ELO.	
ELO 3  Students recognize the importance of statistical ideas.	Embedded exam questions	Our goal is for 80% of the students in the course to answer items correctly; we consider this to be above average performance and to demonstrate successful achievement of the ELO.	

## Arts and Sciences Distance Learning Course Component Technical Review Checklist

**Course:** STAT 3470

**Instructor: TBD**

## Summary: Introduction to Probability and Statistics for Engineers

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>All items seem to be contained within Carmen.</li> </ul>
6.2 Course tools promote learner engagement and active learning.	X			<ul style="list-style-type: none"> <li>Canvas Conversations</li> <li>Carmen Message 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			No external tools are used
<b>Standard - Learner Support</b>				
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.
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
<b>Standard – Accessibility and Usability</b>				
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			Accessibility links are provided for all tools.
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: 2/10/20
- Reviewed by: Ian Anderson

**Notes: Add dates to the weekly breakdown. This course should be listed as a hybrid course. The syllabus mentions meeting at a specific location for tests with no distance option. This is not allowed in 100% distance courses.**

<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.