

# IE 330 – Engineering Analytics

Harold and Inge Marcus Department of Industrial and Manufacturing Engineering  
The Pennsylvania State University, University PA

**INSTRUCTOR:** Hui Yang, Ph.D.  
**PHONE:** 814-865-7397  
**EMAIL:** All emails must be sent through **Canvas** to ensure that I receive all of your emails and for you to receive a reply timely. This ensures that your email does not get mixed with my other general emails.

**OFFICE:** 221 Leonhard Building  
**OFFICE HOURS:** Tuesday Thursday 3:30-4:30pm (see zoom section for meeting links in Canvas)

**TA1:** Meng Liu ([software programming, lab sessions, and project grading](#))  
**EMAIL:** All emails must be sent through **Canvas** to ensure that I receive all of your emails and for you to receive a reply timely. This ensures that your email does not get mixed with my other general emails.

**OFFICE HOURS:** Tuesday Thursday 2-3:30pm (see zoom section for meeting links in Canvas)

**TA2:** Kevin Mekulu ([recitations, homework/exam questions and grading](#))  
**EMAIL:** All emails must be sent through **Canvas** to ensure that I receive all of your emails and for you to receive a reply timely. This ensures that your email does not get mixed with my other general emails.

**OFFICE HOURS:** Monday Wednesday Friday 4:30-5:30pm (see zoom section for meeting links in Canvas)

**TEACHING INTERN:** Rachel Elizabeth Bartuska ([software programming, homework, project questions](#))  
**EMAIL:** All emails must be sent through **Canvas** to ensure that I receive all of your emails and for you to receive a reply timely. This ensures that your email does not get mixed with my other general emails.

**OFFICE HOURS:** Tuesday 11:15am-12:45pm (see zoom section for meeting links in Canvas)

## REUIRED TEXTBOOK:

[An Introduction to Statistical Learning](#) by Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani

**PREREQUISITE:** [IE 322](#) and [CMPSC 200](#), [CMPSC 201](#) or [CMPSC 202](#)

## COURSE OBJECTIVES:

Industry in the 21<sup>st</sup> century is investing in a variety of sensor networks and dedicated data centers to increase information visibility. Present technological advances are bringing massive data torrents in shorter time scales. This offers unprecedented opportunities to manage, analyze, visualize, and extract useful information from large, diverse, distributed and heterogeneous data sets so as to make better decisions, improve the system performance, and optimize the operational management. Data are motivating a profound transformation in the operation management in every field of engineering and business.

This course of Engineering Analytics provides students with a quantitative background in descriptive analytics which deals with data mining, predictive analytics which deals with forecasting. Examples of analytics will be presented in various industries including manufacturing, healthcare, and distribution. The students will learn to work in settings to make data-informed decisions from large data sets.

## COURSE OUTCOMES:

- 2.6 Gain in-depth knowledge of data storage, analysis and visualization related to m.f.g. and service domains.
- 4.2 Demonstrate knowledge of contemporary issues: data management, analytics, and advanced visualization.
- 5.1 Work effectively in groups on case studies.

## MAJOR TOPICS:

<u>Topic</u>	<u>Minimum Reading Assignment</u>
Introduction to data analytics	Ch. 1, lecture notes
Statistical learning	Ch. 2, lecture notes
Linear regression	Ch. 3, lecture notes
Classification	Ch. 4, lecture notes

## GRADING POLICY

Quiz/Homework – 20%  
Projects – 20%  
Midterm Exam – 30%  
Final Exam – 30%

Exam dates will be announced as the course progresses. Final grade will be determined based on the student performance in different evaluation elements, as shown above. No make-up exams unless previous arrangements have been made. Students will be expected to attend class and prepare assignments. Habitual failure to do so will result in a reduced grade. An incomplete grade will only be given when a student misses a portion of the semester because of illness or accident. Cheating on examinations, plagiarism and other forms of academic dishonesty are serious offenses and may subject the student to penalties ranging from failing grades to dismissal. Grading scale will be used: A: 90+; B: 80+; C: 70+; D: 60+, F: <60

## CLASS POLICY

- Homework problem sets will be assigned during the semester. **Please use the assignment page as the cover page of your homework submission.** Homework solutions **must** show all steps clearly for full credit. Assignments not meeting these specifications will not be accepted.
- Homework is due one week after it is assigned. No late homework will be accepted. **Please submit and upload your solutions as a single PDF file to the CANVAS website. Please DO NOT submit through emails or hardcopies. Email and hardcopy submission will not be accepted and graded. If you do not submit your homework on the assigned due date it will be considered late.** At the end of the semester, the lowest assignment grade will be dropped.
- ***Exams must be taken on the scheduled exam dates.*** Students are required to arrange with the instructor in advance for a make-up exam in the event of extenuating circumstances that prevent them from taking the exam as scheduled. In the event of an unforeseen emergency that prevents the student from taking the exam as scheduled, the student must provide documentation to the instructor before a make-up exam can be arranged. ***Anyone missing exams without notifying me ahead of time (and/or for a reason not deemed justifiable) will not be able to make it up.***
- In the event of extenuating circumstances, please submit documentation (printed, signed, and dated by students and relevant authorities) to the instructor at least two days ahead of the class for approval. If it is not a university excuse, it will not be accepted. Dropping an email to me without any documentation will not be accepted.
- If you believe there was an error in the grading of an exam, you may submit the entire exam for a regrade. This must be done ***within one week*** from the date the exam was returned. The entire exam will be regraded, so that you may gain, or lose, points by resubmitting.

## COMMUNICATION AND INSTRUCTION VIA CANVAS

Communication in the course will be through official electronic means: PSU assigned e-mail address and the course website in CANVAS (<https://psu.instructure.com/>). DUE to the large volume of emails the instructor receives every day, please contact me via the CANVAS Email system - clicking on "Inbox" (left column in the CANVAS website) and then sending me a course email. I will respond within 24-48 hours. Students are responsible for all information conveyed during class and on CANVAS. It is the student's responsibility to make sure they are receiving their official PSU email and checking course updates in the CANVAS website.

**To access CANVAS, go to:** <https://psu.instructure.com/>

Go to Dashboard and then click on IE 330: Engineering Analytics. Check this website frequently for: Course syllabus, important announcements, homework sets, lecture notes, emails, grades, and additional resources.

## INSTRUCTOR'S COMMITMENT

You can expect your instructor to be courteous, punctual, well-organized, and prepared for the lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if he is unable to keep them; and to grade uniformly and consistently according to the posted guidelines.

## STUDENTS WITH DISABILITIES SERVICES

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at <http://equity.psu.edu/ods/>.

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at <http://equity.psu.edu/ods/guidelines/documentation-guidelines>). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

## ACADEMIC INTEGRITY

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (refer to [Senate Policy 49-20](#)) Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to [Senate Policy G-9](#)).

### *My expectation:*

- You should always put forth work that is an honest representation of your learning on the subject matter.
- **Each assignment done for this class is expected to be an individual effort.** Before an exam, students often ask me 'What is the best way to study for this exam?' My answer is always the same, 'Practice!' I truly believe that in order to fully understand this material, you must work out the problems on your own. You do not have to 'get' how to do a problem right away; let your mind go through the thinking process. For any problem assigned, we have probably done something exactly or very similar to it in class. Go through your notes and try to understand what needs to be done and why. The more problems you do, the better you will get at solving these problems. With practice, doing the calculations become second nature, so that you will not only know how to do the calculations without much thinking, but you will automatically get faster at doing them, as well.

### *What if you cannot solve the problem on your own?*

- The key is to start the assignments as early as possible so that you can get help from the TA or myself, if needed.
- My first preference is for you to come and see either the TA or myself during office hours. We can help you understand the concepts, and you can have confidence that we will steer you in the right direction (not always the case when you rely on your friends, who are also learning the concepts for the first time).
- It is okay to discuss the *approach* with other students and why the problem should be solved using that particular method. However, this is where the discussion should end. All calculations and conclusions should be your own.

*Good luck and have a great semester!*