Worcester Polytechnic Institute, Department of Mathematical Sciences - Term C Spring 2023

Course Syllabus
MA 2621-CL02 Probability for Applications

Faculty Information

Instructor:	Nadeesha Jayaweera, Ph.D
Email:	njayaweera@wpi.edu
Office:	SH 002B
Office Hours:	MTRF 10:00 AM - 11:00 AM (in-person) or by appointment

Course Information (Lecture CL02)

Time:	MTRF 12:00 PM - 12:50 PM
Place :	In-person; Atwater Kent 116 Newell Hall
Website:	https://canvas.wpi.edu/courses/43981

(The website is the main platform through which this course will be managed. It contains the syllabus (this document), lecture notes, videos (all student have access to recorded ECHO360 videos after each class), announcements, and other course materials. You are responsible for knowing the information in the materials that appear there)

Discussion

Section	Place	Date	Time	TA/PLA	E-mail
CD06	Stratton Hall 306	W	12:00 PM - 12:50 PM	Shiyu Wu	swu4@wpi.edu
CD07	Olin Hall 126	W	12:00 PM - 12:50 PM	Xiaohui Chen	xchen8@wpi.edu
CD08	Stratton Hall 304	W	1:00 PM - 1:50 PM	Sarah Amato	samato@wpi.edu
CD12	Stratton Hall 308	W	3:00 PM - 3:50 PM	Sarah Amato	samato@wpi.edu

Office Hours:

- Sarah Amato: W 2:00 PM - 3:00 PM (SH 204)
- Shiyu Wu: F 1:00 PM - 2:00 PM (Zoom ID: 324 660 8766)
- Xiaohui Chen: M 2:00 PM - 3:00 PM (SH 205)

Textbooks

- *Elementary Probability for Applications* , Rick Durrett (2009)(ISBN 978-0-521-86756-6; **Required**)
- *Introduction to Probability (-GNU Free Document License (FDL))*, Charles M.Grinstead and J.Laurie Snell, 2nd Ed. (2006)

  http://www.math.dartmouth.edu/~prob/prob/prob.pdf

Ways to contact instructor: via canvas or e-mail

Please write "MA 2621" in the e-mail subject line. I will respond within 24 hours during the workweek (ex-cluding holidays) and 48 hours during the weekend.

Course Description

This course is designed to cover topics from mathematical statistics that are of interest to students from engineering and/or the sciences. Chapters 1, 2, 3, 5, 6 of Elementary Probability for Applications will be covered (some sections may not be covered).

- Basic probability theory: set algebra, marginal probability, conditional and total probability, Bayes' Rule, independence, and counting.
- Discrete random variables (Binomial, Geometric, and Poisson). Probability mass functions and moments (expectation and variance).
- Continuous random variables (Normal). Probability density functions and cumulative distribution functions. Derived and multivariate distributions.
- Limit theorems: Chebyshev's inequality, law of large numbers, and central limit theorem.

Learning Outcomes

Students will able to:

- classify basic axiomatic principles of probability using set theory. Counting with permutations and combinations. Evaluate probability of experiments through simulations of experiments.
- identify common discrete and continuous random variable distributions. Solve problems for general mass and density function cases.
- implement probability in conditional and joint distribution cases.
- execute probability with the summation of independent random variables.
- apply expectation and variance formulas for probability distributions, along with other moments through generating functions.

Prerequisite Courses

MA 1021-22, some multivariate calculus MA 1024 material will also be used.

Homework

Homework Assignment will be assigned weekly for your benefit and practice. **All the HWK submissions are due at 11.59 p.m. (on Thursdays) online through Canvas**.

- HWK 1: R, Jan 19
- HWK 2: R, Jan 26
- HWK 3: R, Feb 02
- HWK 4: R, Feb 16
- HWK 5: R, Feb 23

It is every student's responsibility to be aware of homework deadlines and plan accordingly to complete the assignment by that deadline. Discussion with peers regarding material/concepts covered in the course is permitted, and is encouraged since it usually leads to greater comprehension. However, each person must write up his/her own solution to a particular problem, and not simply copy it from someone else. If you have any questions feel free to see me.

Quizzes

Five quizzes will be held on Mondays. **One single-sided hand written sheet** is allowed for each quiz. No electronics are allowed during the quizzes except a calculator (scientific/graphing). Content is based on the previous homework. **(Duration: 10 minutes)**

- Quiz 1: M, Jan 23
- Quiz 2: M, Jan 30
- Quiz 3: M, Feb 06
- Quiz 4: M, Feb 20
- Quiz 5: M, Feb 27

Exam Dates & Policies

2 exams (based on the material covered until the latest lecture before each) will be given on the following dates:

- Exam 1: F, Feb 10 (Chapters 1 & 2)
- Exam 2: F, Mar 03 (Chapters 3,5, & 6)

The dates of these exams **will not change.** Please be sure to plan accordingly. **One double-sided hand written sheet** is allowed for each exam. No electronics are allowed during the exams except for a simple calculator. Calculator apps on a smartphone, tablet, kindle, etc are **not** allowed. Sample exams will be posted online. No makeup exam will be given unless a student notify me with a legitimate excuse by writing prior to the exam.

Grading Criteria & Grading Scale

There will be 2 exams, a homework score, and a quiz score for the final grade calculation.

- Homework: 10%
- Quizzes: 25%
- Exam 01: 30%
- Exam 02: 35%

Your final grade in this course will consist of the above weighted components and be determined by the following scale.

$$A : 90 - 100 \qquad B : 80 - 89 \qquad C : 70 - 79 \qquad NR : \text{Below } 70$$

Class Policies

If students miss a class, IT IS THEIR RESPONSIBILITY to find out what they missed (announcements, assignments, notes...). Also, it is their responsibility to frequently check the canvas page for announcements made by the instructor. Students are strongly encouraged to read each section of the text book in advance of the lecture. Classes start and end always **on time**. Students are not allowed to leave the class before the end of the hour without authorization. During the class time it is not allowed to text, chat and sleep. All electronic devices must be put in silent mode.

Students With Approved Academic Accommodations

Students with approved academic accommodations should plan to submit their accommodation letters through the Office of Accessibility Services Student Portal. Should you have any questions about how accommodations can be implemented in this particular course, please contact me as soon as possible. Students who are not currently registered with the Office of Accessibility Services (OAS) but who would like to find out more information regarding requesting accommodations and what that entails should plan to contact them via email: `AccessibilityServices@wpi.edu` and/or via phone: (508) 831-4908. Please also contact me as early as possible in the term so I can address your specific needs.

Academic Honesty

The academic honesty policy can be accessed at: `http://www.wpi.edu/Pubs/Policies/Honesty/Students/` Consequences for violating the Academic Honest Policy range from earning a zero on the assignment, failing the course, or being suspended or expulsion from WPI. The Dean of Students Office maintains judicial records for any act of academic dishonesty.

Additional Help

Math Department Tutoring Center (MTC)
The Math Department Tutoring Center (MTC; Gordon Library, room 305): A variety of math TA and PLA tutors are available on M-R 10-5pm and F 10-2pm. You can also use help from

the ARC, which includes one-on-one tutoring appointments.

Academic Resources Center (ARC) services
Peer tutoring and Math and Science Help (MASH) will be offered in person by the Academic Resources Center (ARC) tutors in C term on the 5th floor of Unity Hall in the ARC or the Exam Proctoring Center (EPC, UH 505). Individual tutoring will be available from 10am-10pm Monday through Thursday, 10am-5pm Friday, and 12pm-10pm Sunday. Students should use tutortrac.wpi.edu to sign up for individual tutoring appointments that fit their schedule. No appointments are needed for MASH group sessions. If a student has a time conflict or looking for a tutor and there is limited availability, please reach out to the Academic Resources Center (arc@wpi.edu) or submit availability through this form: `Bit.ly/ARCTutor` in order to request additional tutoring that best aligns with their schedule.

C Term 2023 MASH will begin on Thursday January 12, 2023, and end on Wednesday March 1, 2023. There will be no tutoring or MASH on January 16, 2023, February 1, 2023, or February 23-24, 2023. Further information about MASH and tutoring offered by the ARC are located on the Academic Resources Center Canvas Page (`https://canvas.wpi.edu/courses/8168`) and on the Academic Advising and Academic Resources Center WPI Webpage (`https://www.wpi.edu/student-experience/resources/academic-resources-center`)

C-Term tutor names in MA 2621:
Alex Ballentine, Jeffrey Chan, Cooper Dean, Trajan Espelien, Andrew Hariyanto, John Lemieux, Lucas Rodgers

Tentative Schedule

(As of start of term: Can be changed a little due to time!)

M	T	W	R	F
	01/10 Syllabus, Introduction & Chapter 01	01/11	01/12	01/13
01/16 No Classes (Martin Luther King Day)	01/17	01/18	01/19 HWK 1 Due	01/20
01/23 Quiz 01	01/24	01/25	01/26 Chapter 02 HWK 2 Due	01/27
01/30 Quiz 02	01/31	02/01 No Discussions (Wellness Day)	02/02 Chapter 03 HWK 3 Due	02/03
02/06 Quiz 03	02/07	02/08	02/09 Review 01	02/10 Exam 01
02/13	02/14	02/15	02/16 Chapters 05-06 HWK 4 Due	02/17
02/20 Quiz 04	02/21	02/22	02/23 No Classes (Academic Advising Day) HWK 5 Due	02/24 No Classes (Wellness Day)
02/27 Quiz 05	02/28	03/01	03/02 Review 02	03/03 Exam 02