# MATH 431 section 002 Syllabus

**WISCONSIN**
UNIVERSITY OF WISCONSIN–MADISON

Introduction to the Theory of Probability

## COURSE INFORMATION

**Introduction to the Theory of Probability**
MATH 431 002 ( 3 Credits )
2021 Fall [1222]

### Prerequisite(s)
MATH 234 or 376 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program

### Breadths
N - Natural Science

### Instruction Mode
Classroom Instruction

### Section Level Com B
False

**Department:** Mathematics
**College:** Letters and Science

### 2021 Fall [1222]
**Term Start Date:** Monday, 23-Aug-2021  **Term End Date:** Tuesday, 1-Feb-2022

**Location and Schedule:** Engineering Hall 3024 MWF 8:50 AM-9:40 AM
**CRN:** 158851222

## How Credit Hours are Met :

### How Credit Hours are Met

This class meets for three 50-minute class periods each week over the semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

## Regular and Substantive Student-Instructor Interaction :

Participation in regularly scheduled learning sessions (where there is an opportunity for direct instruction, providing feedback on student work, providing information about course content, facilitating discussion of course content).

# INSTRUCTORS AND TEACHING ASSISTANTS (TAs)

## Instructor

**Mikhail IVANOV**
✉ MIVANOV@WISC.EDU

### Instructor Availability and Preferred Contact :

Mikhail Ivanov (office: Van Vleck B127; email: mivanov@wisc.edu)
Office hours: Monday, Wednesday  14:30–15:30 (Birge 348, check course page), or by appointment (online, Zoom).

### TA Availability and Preferred Contact  :

Grader: Shilu He  (she252@wisc.edu)
Course Assistant: Yiping Van Vleck B135 (old Math Library), Tuesdays from 5:00 – 7:00 PM,  Thursdays from 5:00 – 7:00 PM

# COURSE OUTCOMES, GRADING, and OTHER COURSE MATERIALS

## Course Learning Outcomes (CLOs) :

Use multiple approaches to compute and estimate probabilities and expectations (e.g., using the indicator method, using conditioning, estimating probabilities using normal or Poisson approximation etc.).

C1-4

Recall and state the formal definitions of the mathematical objects and their properties used in probability theory (e.g., probability spaces, random variables and random vectors and their probability distributions, named distributions, conditional probability, independence, linearity of expectation, etc.).

C1-1

Construct mathematical arguments related to the above definitions, properties, and theorems, including the construction of examples and counterexamples.

C1-5

Use such definitions to argue that a mathematical object does or does not have the condition of being a particular type or having a particular property (e.g., whether certain events or random variables are independent or not, whether a random variable has one of the named distributions, whether or not a sequence of random variables is exchangeable, etc.).

C1-2

Recall and state the standard theorems of probability theory. (e.g., Bayes' theorem, the law of large numbers, the central limit theorem, etc.), and apply these theorems to solve problems in probability theory.

C1-3

Convey his or her arguments in oral and written forms using English and appropriate mathematical terminology and notation (and grammar).

C1-6

Model simple real-life situations using techniques in probability theory and calculate probabilities and expectations associated with those models.

C1-7

## Grading :

The course grade is based on two midterms and final exam, as well as regular homeworks. Final grades are curved. Each midterm is worth 24%, and the final exam is worth 36%. The graded homeworks are worth 15%, and quizzes are worth 1%.

## Course Website, Learning Management System and Digital Instructional Tools :

Canvas: https://canvas.wisc.edu/courses/261878
Piazza: piazza.com/wisc/fall2021/fa21math431002/home
Zoom: will be provided, if needed.

## Required Textbook, Software, & Other Course Materials :

Textbook: Introduction to Probability by David Anderson, Timo Seppäläinen, and Benedek Valkó. **(required)**

## Homework & Other Assignments :

Homeworks will be marked by a graduate student assigned to me.
Your work on these exercises should be well presented, in good English. A clear explanation is
just as important as the correct answer. Collaborating with other students on the homework
is encouraged, but you must write up all reasoning and solutions on your own (in other words,
no copying).
Failure to abide by this guideline could be construed as a form of academic dishonesty (see the section on Academic

Integrity below). Late homework will generally not be accepted, though I will drop the lowest homework grade at the end of the course. Each student should upload their completed homework to the Canvas website. To do this, scan it or take a photo or create a pdf file, and upload the file to the Assignments tab on Canvas.

## EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

Exams, Quizzes, Papers & Other Major Graded Work :

Here is the exams schedule:
• Exam I: Wednesday, October 13th, 5:30pm--7:00pm, in-class.
• Exam II: Wednesday, Novermber 17th, 5:30pm--7:00pm, in class,
• Final exam: Tuesday, December 21st, 07:45am−09:45am, cumulative, in-class.

To help prepare for the exams we will have short in-class "surprise" quizzes. It is your responsibility to attend lectures and quizzes. The lowest score will be dropped.

## ADDITIONAL COURSE INFORMATION AND ACADEMIC POLICIES

### 🏛 Privacy of Student Information & Digital Tools: Teaching & Learning Analytics & Proctoring Statement

The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported digital tools used to support teaching and learning, to help support success through learning analytics, and to enable proctoring capabilities.  UW-Madison takes necessary steps to ensure that the providers of such tools prioritize proper handling of sensitive data in alignment with FERPA, industry standards and best practices.

Under the Family Educational Rights and Privacy Act (FERPA – which protects the privacy of student education records), student consent is not required for the university to share with school officials those student education records necessary for carrying out those university functions in which they have legitimate educationl interest. 34 CFR 99.31(a)(1)(i)(B).  FERPA specifically allows universities to designate vendors such as digital tool providers as school officials, and accordingly to share with them personally identifiable information from student education records if they perform appropriate services for the university and are subject to all applicable requirements governing the use, disclosure and protection of student data.

# Privacy of Student Records & the Use of Audio Recorded Lectures

See information about privacy of student records and the usage of audio-recorded lectures.

Lecture materials and recordings for this course are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

# How to Succeed in This Course

Resource links to other campus services:

- University Health Services
- Undergraduate Academic Advising and Career Services
- Office of the Registrar
- Office of Student Financial Aid
- Dean of Students Office

# Course Evaluations

Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your confidential feedback is important to me. I strongly encourage you to participate in the course evaluation.

### Digital Course Evaluation (AEFIS)

UW-Madison uses a digital course evaluation survey tool called AEFIS. In most instances, you will receive an official email two weeks prior to the end of the semester, notifying you that your course evaluation is available. In the email you will receive a link to log into the course evaluation with your NetID. Evaluations are anonymous. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

# Students' Rules, Rights & Responsibilities

Rights & Responsibilities

For fall 2021, instructors and students should consult the following website for current campus health and safety guidance: covidresponse.wisc.edu.

## Diversity & Inclusion Statement

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.

## Academic Integrity Statement

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

## Accommodations for Students with Disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (UW-855) require the university to provide reasonable accommodations to students with disabilities to access and participate in its academic programs and educational services. Faculty and students share responsibility in the accommodation process. Students are expected to inform faculty [me] of their need for instructional accommodations during the beginning of the semester, or as soon as possible after being approved for accommodations. Faculty, will work either directly with the student or in coordination with the McBurney Center to provide reasonable instructional and course-related accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

## Academic Calendar & Religious Observances

Academic Calendar & Religious Observances