

# Course Syllabus

## STAT 541: Probability

- Description:** *A course in probability with some topics applicable to statistics. Topics include probability spaces, random variables, classical discrete and continuous probability distributions, multivariate probability distributions with an introduction to multi-variable calculus, joint and conditional distributions.*
- Credit Hours:** 4
- Frequency:** Offered every third semester
- Audience:** Elective for the M.S. in Analytics and Modeling
- Prerequisites:** An introductory statistics course and a calculus course
- Format:** 4 class sessions (50 min each) per week
- Textbook:** *Mathematical Statistics with Applications, 7th Ed.*, by Wackerly, Mendenhall, and Scheaffer (*recommended, not required*)
- Technology:** A calculator that is not on a cell phone/tablet/laptop is required for the exams, and should also be brought to class daily for in-class activities. Course materials and grades are maintained in Blackboard, and students should check Blackboard regularly.
- AARC:** The Access and Accommodations Resource Center (AARC) is the campus office that works with students to provide access and accommodations in cases of diagnosed mental or emotional health issues, attentional or learning disabilities, vision or hearing limitations, chronic diseases, or allergies. You can contact the office at [aarc@valpo.edu](mailto:aarc@valpo.edu) or 219.464.5206. Students who need, or think they may need, accommodations due to a diagnosis, or who think they have a diagnosis, are invited to contact AARC to arrange a confidential discussion with the AARC office. Further, students who are registered with AARC are required to contact their professor(s) if they wish to exercise the accommodations outlined in their letter from the AARC.
- Notice of Cancellation:** Notifications of class cancellations will be made through Blackboard with as much advance notice as possible. It will be both posted on Blackboard and sent to your Valpo e-mail address. If you don't check your Valpo email account regularly or have it set-up to be forwarded to your preferred email account, you may not get the message. Please check Blackboard and your Valpo email (or the e-mail address it forwards to) before coming to class.

### Student Learning Objectives:

- A. Students can apply basic probability rules and can identify when events are disjoint or independent.
- B. Students can compute probabilities, expectation, variance, and moment-generating functions of both discrete random variables and continuous random variables.
- C. Students can identify the common named distributions (Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson, Uniform, Normal, Exponential, Gamma, and Beta).
- D. Students can perform computations with multivariate distributions, including probabilities, marginal and conditional distributions, expectation, covariance, and conditional expectation.
- E. Students can derive the distribution of functions of random variables, using the method of distribution functions, method of transformations, and method of moment-generating functions.
- F. Students understand the importance of the Central Limit Theorem and can apply it to approximate probabilities.