Course Overview

**Purpose**  We develop the mathematical theory of Probability from *first principles*—with no assumed background or prior experience.

Probabilities are sometimes a challenge to calculate but are always easy to interpret: A probability is a number between 0% and 100% inclusive that reflects the percentage chance that an (uncertain) event actually occurs!

Probability calculations *directly* answer some scientific questions.

Probability also measures the accuracy and reliability of scientific inquiry known as Statistical Inference whereby *data samples* (informative measurements) are *generalized* to broader conclusions.

The fascinating interplay between Probability (deductive reasoning) and Statistical Inference (inductive reasoning) motivates our course!

**Specific Topics**

- Law of Large Numbers, Central Limit Theorem, Sampling Distributions
- Maximum-Likelihood Estimators
- Confidence Intervals and Sample Size Determination
- Hypothesis Tests and *P*-Values
- Regression (Statistical Prediction)

Course Information

**Class**  1:30–2:20 MWThF  105 EPB  **Prerequisite:** Calculus II or equivalent

**Instructor**  Blake Whitten  Office: 260 Schaeffer Hall  (319) 335-0647  blake-whitten@uiowa.edu

**Office Hours:**  **One hour each Monday, Wednesday, and Thursday:**

- First half hour 2:20 - 2:50 in 105 EPB immediately following class
- (10 min transit 2:50 - 3:00 from EPB to SH)  Second half hour 3:00 - 3:30 in 260 SH

**Required Course Materials**  *(Bring 3 items to each class!)*

- **Notebook:**  *Notes for STAT 3120: Probability & Statistics* by Whitten, 2019
- **Dedicated Calculator:**  *(cell phone doesn’t work)*, must calculate *standard deviation* and *regression* from data entry. Google your calculator model to confirm this functionality.
Course Features

Study Teams/Team Homework

- Students form *study teams* for support. Rely on team members for help—with challenging homework or for notes from a missed class! To save time, teams can send representatives to Prof. Whitten’s office hours, and report back to the team.

- Each study team submits a single (common) Homework write-up each week. (No electronic submissions.) Each contributing team member earns the common team HW grade.
  
  - HW write-ups are due before class starts on the due date. (A 50% grading penalty applies to late papers.)
  
  - Prof. Whitten sometimes asks teams to present specific solutions to the class on the HW due date. Teams who are ready and who share the presentation among several team members earn the most Participation grade consideration. (Show your HW write-up to the class on the document camera at the podium and explain your reasoning.)
  
  - Follow HW style guidelines so that the grader clearly understands your answers. The grader grades HW both on correct answers and effective and clear writing.
  
  - Recommended Best Practice: Team members work all HW problems individually then meet in teams to thrash out differences and compose the team write-up.

HW Style Guidelines:

- Place a box around each final numerical answer.
- Show all important steps in reasoning. (Convince the grader!)
- Staple write-up. Write team number and names of all team members who contribute in the top right corner. (Grading credit earned *only* by members who contribute.)

Attendance/Participation

- Attendance Sign the attendance clipboard each day when you arrive. Also mark if you are late (arrive after 1:30 PM.)

  - ICON Roll Call Attendance: 100% daily credit arrive on time, 80% credit arrive late.

- Participation - Prof. Whitten’s completely subjective score for effort, engagement, progress.

  - Individual effort and progress through the semester
  
  - Contributes to class discussion? (Includes asking occasional good questions and thoughtful answers.) *Never be shy to risk answering incorrectly! Incorrect answers help the class more than correct ones!* 😊
  
- Contributes well to his/her team? Appreciated by other team members?

- Participation & Attendance Score (see Grades section) is weighted 50% on Attendance and 50% on Participation.
Individual Assessment: Quizzes & Exams

- Quizzes CAN and DO cover **ANYTHING discussed in the course** such as textbook reading, Notebook worksheets and homework. Quizzes tend to **emphasize recent HW**.

- Quizzes are time-sensitive so in place of makeup quizzes and as an explicit allowance for necessary absence (university-sanctioned event, illness, family emergency, etc.) the lowest quiz score is **dropped** from the course grade calculation.

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- **Midterm Exam 1** - Covers textbook through Section 2.3, Worksheets 1–12, and HW 1–5.
  
  - **Exam 1 Tools**: Calculator (no cell phones), closed-book except for Discrete Distribution formulas (front hardcover text, p. 359 paperback) and Tables II and III (back page.)

- **Midterm Exam 2** - Covers textbook Sections 2.4-2.6 and Chapter 3. Covers Worksheets 13–18 and HW 6–10.
  
  - **Exam 2 Tools**: Calculator, closed-book except for Discrete and Continuous Distribution formulas and tables in back. Also one hand-written or word-processed notebook-sized (8 1/2 × 11 inch) sheet of paper, front and back, for formulas and notes. (No photocopies.)

- **Final Exam** - Comprehensive, covers all worksheets, HW and related textbook reading.
  
  - **Final Exam Tools**: Calculator + Textbook (Distribution formulas and Tables ONLY) + TWO hand-written or word-processed notebook-sized (8 1/2 × 11 inch) sheets of paper, front and back, for formulas and notes.

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- Students must take exams as scheduled except for officially university-approved absence such as illness, religious observance, and NCAA athletic competition. Makeup exams are **not** available for other reasons, including student org field trips, club competitions and personal events. If an absence is university-approved, the final exam score substitutes for the missing midterm exam score.
## Friday (HW Due Date & Assessment) Schedule  
(tentative and subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Friday</th>
<th>Team HW Due</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug. 30</td>
<td>− − −</td>
<td>− − −</td>
</tr>
<tr>
<td>2</td>
<td>Sept. 6</td>
<td>HW0 (WS1)</td>
<td>− − −</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>HW1</td>
<td>Quiz 1</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>HW2</td>
<td>Q2</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td>HW3</td>
<td>Q3</td>
</tr>
<tr>
<td>6</td>
<td>Oct. 4</td>
<td>HW4</td>
<td>Q4</td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>HW5</td>
<td>Q5</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
<td>− − −</td>
<td>Exam 1</td>
</tr>
<tr>
<td>9</td>
<td>25</td>
<td>HW6</td>
<td>Q6</td>
</tr>
<tr>
<td>10</td>
<td>Nov. 1</td>
<td>HW7</td>
<td>Q7</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>HW8</td>
<td>Q8</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>HW9</td>
<td>Q9</td>
</tr>
<tr>
<td>13</td>
<td>22</td>
<td>HW10</td>
<td>Exam 2</td>
</tr>
<tr>
<td>14</td>
<td>29</td>
<td>T-Day Holiday</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dec. 6</td>
<td>HW11</td>
<td>Q10</td>
</tr>
<tr>
<td>16</td>
<td>13</td>
<td>− − −</td>
<td>− − −</td>
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</tbody>
</table>
Course Grades

- **Attendance Requirement:**
  Teamwork and class participation are so important in Stat 3120 that a student who **misses (or is substantially late to) 10 or more classes** during the semester that are not university-approved absences (the equivalent of about two and a half weeks) is automatically dropped from his/her study team and **fails the course** (earns a grade of F.)

- **Weights for Course Percentage:**
  10% Participation & Attendance
  10% Homework (study teams)
  25% Quizzes
  30% Midterm Exams (15% each, exam dates announced at least one week in advance)
  25% Final Exam (comprehensive)
  100%

- **Calculate Course Percentage:**
  1. Drop the lowest Quiz score. Calculate Quiz Percent from the remaining scores.
  2. Then calculate:

  \[
  \text{Course }\% = (0.10)(\text{Participation/Attendance}) + (0.10)(\text{Homework}) + (0.25)(\text{Quiz}) + (0.15)(\text{Midterm 1}) + (0.15)(\text{Midterm 2}) + (0.25)(\text{Final Exam})
  \]

- **Course grades are earned according to the following minimum Course Percentage:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>92%</td>
</tr>
<tr>
<td>A−</td>
<td>90%</td>
</tr>
<tr>
<td>B+</td>
<td>88%</td>
</tr>
<tr>
<td>B</td>
<td>82%</td>
</tr>
<tr>
<td>B−</td>
<td>80%</td>
</tr>
<tr>
<td>C+</td>
<td>78%</td>
</tr>
<tr>
<td>C</td>
<td>72%</td>
</tr>
<tr>
<td>C−</td>
<td>70%</td>
</tr>
<tr>
<td>D+</td>
<td>68%</td>
</tr>
<tr>
<td>D</td>
<td>62%</td>
</tr>
<tr>
<td>D−</td>
<td>60%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
</tr>
</tbody>
</table>

For example, a course percentage of 87.9999% earns a grade of B in STAT 3120. Course grades are meaningful. All students earn grades on the same scale, without exception.
Absences and Attendance
Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing their course absence policies, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, including Holy Day obligations, unavoidable circumstances, or University authorized activities (https://clas.uiowa.edu/students/handbook/attendance-absences). Students may use this absence form to aid communication; the instructor will decide if the absence is excused or unexcused (https://clas.uiowa.edu/sites/default/files/ABSENCE%20EXPLANATION%20FORM2019.pdf).

Academic Integrity
All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty. Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through the UI email address (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

Accommodations for Disabilities
UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at https://sds.studentlife.uiowa.edu/.

Administrative Home of the Course
The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other colleges may have different policies. CLAS policies may be found here: https://clas.uiowa.edu/students/handbook.

Communication and the Required Use of UI Email
Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within UI (Operations Manual, III.15.2).

Complaints
Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences. For more information, see https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.

Final Examination Policies
The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals. Visit https://registrar.uiowa.edu/final-examination-scheduling-policies.

Nondiscrimination in the Classroom
UI is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (diversity.uiowa.edu).

Sexual Harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see https://osmrc.uiowa.edu/.