Instructor: Prof. RUSSO  205 SH  335-0817  rp-russo@uiowa.edu

Office Hrs: TBA. Students who seek out-of-class help from me are expected to have excellent attendance in the lecture.


Format: Please do not arrive late or leave early, or engage in any “distracting” activities (reading newspapers, communicating with others, web-surfing, etc.)

Homework: You will work in teams of 4 or 5. HW is due in lecture, TWO Wednesday’s after it is assigned. Each team makes a single submission. HW should be neat & stapled, with team member names in the top right corner. Late HW: before 5PM on date due = 10% penalty, the weekday after = 25%, 2 weekdays after = 50%, all other = 100%.

Exams & Quizzes: Appx. six 20-minute quizzes will be given (on Wednesday’s). In addition, two midterm exams will be given during the semester, & a cumulative final exam during Finals Week. Single-purpose calculators (no smart phones, etc.) are to be used on exams & quizzes. ALL materials are to be placed directly into my hands, or those of a proctor.

Make-ups: Make-up exams/quizzes will be given on rare occasions. If something unexpected arises (emergency, illness, religious, etc.) let me know as soon as possible, and we will discuss your situation.

Grades:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Appx. 6 quizzes on Wednesdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOMEWORK</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>QUIZZES</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>MIDTERM EXAM 1</td>
<td>20%</td>
<td>27 Sept 6:30-8:30PM (tent)</td>
</tr>
<tr>
<td>MIDTERM EXAM 2</td>
<td>20%</td>
<td>1 Nov 6:30-8:30PM (tent)</td>
</tr>
<tr>
<td>CUMULATIVE FINAL EXAM</td>
<td>30%</td>
<td>During finals week</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

As a rough guide "A" = 90%, "B" = 80%, "C" = 70%, "D" = 60%.

Tutors: For a list of independent tutors go to http://www.stat.uiowa.edu/resources/tutoring

Disabled students: I would like to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please see me after class or during office hours.

Policies: Course policies are governed by the College of Liberal Arts and Sciences. For University policies regarding Student Rights and Responsibilities go to http://www.clas.uiowa.edu/students/academic_handbook/

DEO: Prof. Tierney, 241 SH, 335-0712, luke-tierney@uiowa.edu
Instructor: Prof. R. RUSSO  205 SH  335-0817  rrusso@stat.uiowa.edu

Office Hours: TBA  the best way to reach me is via email

Students who seek out-of-class help from me are expected to have excellent attendance in lecture, & to have thought about the questions they plan to ask.

Course Webpage: go to http://www.cs.uiowa.edu/~rrusso/ then hit COURSES

Text: Hogg & Tanis  Coverage = chapters 5 (review), most of 6, 7 & 8.

Format: class attendance is essential. Please do not arrive late or leave early.

Homework: you will work in teams of size 4. HW is due in lecture. Each team makes a single submission. HW should be neat & stapled, with team member names & assignment number in the top right corner. I will email you assignments & due dates.

Exams & Quizzes: appx. SIX 15-minute quizzes will be given (lowest score dropped). In addition, TWO 90 minute midterm exams will be given (25 Feb & 8 April) from 8-10PM, & a cumulative 2 hour final exam during finals week. If you finish early you may leave - - at risk of missing a clarification, hint or correction.

Make-ups: If something unexpected arises (emergency, illness, religious, etc.) let me know as soon as possible, and we will discuss your situation

Grades: will be based on an overall % determined as follows:

\[
\text{Final\%} = (0.10)\text{HW\%} + (0.20)\text{Quiz\%} + (0.20)\text{1st Midt\%} + (0.20)\text{2nd Midt\%} + (0.30)\text{Final Exam\%}
\]

As a rough guide "A" = 90%, "B" = 80%, "C" = 70%, "D" = 60%.

Tutors: For a list of independent tutors go to http://www.stat.uiowa.edu/courses/tutors.html

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DEO: Prof. Luke Tierney, 241 SH, 335-0712, luke-tierney@uiowa.edu

Joint distributions  
\[
f(x,y) = \frac{6}{5} (x + 2y), \quad 0 < x < y < 1
\]
Marginals:

of Y: \[ f_Y(y) = \int_0^y (6/5)(x + 2y)\,dx = 3y^2, \quad 0 < y < 1 \]

of X: \[ f_X(x) = \int_x^1 (6/5)(x + 2y)\,dx = (6/5)x + (6/5) - 12x^2 / 5, \quad 0 < x < 1 \]

Conditionals:

of X given Y = y \[ f(x \mid y) = \frac{(6/5)(x + 2y)}{3y^2} = \frac{2(x + 2y)}{5y^2}, \quad 0 < x < y \]

of Y given X = x \[ f(x \mid y) = \frac{(6/5)(x + 2y)}{(6x/5) + (6/5) - (12x^2 / 5)} = \frac{(x + 2y)}{x + 1 - 2x^2}, \quad x < y < 1 \]

\[ E[X \mid Y = y] = \int_y^1 x \cdot \frac{2(x + 2y)}{5y^2} \,dx = \frac{8y}{15} \]
\[ E[X^2 \mid Y = y] = \int_y^1 x^2 \cdot \frac{2x + 4y}{5y^2} \,dx = \frac{11y^2}{30} \]

\[ Var[X \mid Y = y] = 11y^2 / 30 - (8y / 15)^2 = 37y^2 / 450 \]

\[ E[E(X \mid Y)] = E(8Y / 15) = \int_0^1 (8y / 15)3y^2 \,dy = 2 / 5 = E(X) \]

\[ E[Var(X \mid Y)] + Var[E(X \mid Y)] = E[37Y^2 / 450] + Var[8Y / 15] = 3 / 50 = Var(X) \]

Double expectation formula

Variance formula

Bayes’ Theorem examples
1) Suppose 1% of a population uses an illegal drug. A drug test correctly identifies 95% of users, but produces a false positive for 2% of non-users. Find \( P(\text{user} \mid + \text{test}) \).

2) 5 red 
5 white
Box A

1 marble
2 red 
8 white
Box B

A marble is transferred from A to B, then a marble is chosen from B. Find \( P(\text{red from A} \mid \text{red from B}) \).

3) Let \( \theta \) denote the probability that a transplant patient survives at least 5 years. The table below gives the prior probabilities of five values of \( \theta \) based on a poll of 10 surgeons.

<table>
<thead>
<tr>
<th>model ( \theta = )</th>
<th>prior</th>
<th>likelihood (2 decimals)</th>
<th>product (3 decimals)</th>
<th>posterior (2 decimals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.25</td>
<td>.10</td>
<td>.01</td>
<td>.001</td>
<td>.01</td>
</tr>
<tr>
<td>.40</td>
<td>.10</td>
<td>.04</td>
<td>.004</td>
<td>.06</td>
</tr>
<tr>
<td>.50</td>
<td>.30</td>
<td>.06</td>
<td>.018</td>
<td>.26</td>
</tr>
<tr>
<td>.75</td>
<td>.30</td>
<td>.11</td>
<td>.033</td>
<td>.47</td>
</tr>
<tr>
<td>.90</td>
<td>.20</td>
<td>.07</td>
<td>.014</td>
<td>.20</td>
</tr>
</tbody>
</table>

Four patients are tracked for 5 years, and the following table is constructed:

<table>
<thead>
<tr>
<th>patient</th>
<th>survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5+</td>
<td>5+</td>
</tr>
<tr>
<td>3.8</td>
<td>5+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
</tr>
</thead>
</table>