

# Statistics—Business Statistics—Summer, 2011

## Project Information

Each student must complete a project, applying what you learn in statistics to a real-world situation. The project will count for the equivalent of one test. Students may complete the project either individually or as part of a group. For those who work in groups, it is important to justify how each person is contributing to the group effort.

### *The Process*

#### 1. *Idea*

- Find a question that could be answered with statistics.

#### 2. *Prospectus*

- **DUE JUNE 2:** Complete a prospectus (1 page) explaining the question, what you hope to accomplish through the project, and how you will go about gathering data. If you are working in a group, explain how you will tentatively divide the work load. A form for this is provided, or you may use your own format. You will either turn this in during class, fax it, or e-mail it.

#### 3. *Gather data.*

- Find accurate, quantifiable information.

#### 4. *Organize data.*

- Organize the data in a meaningful way.

#### 5. *Progress Report*

- **DUE JULY 5:** Complete a progress report (1--2 pages) showing a summary of the data you gathered (or an explanation of when and how it will be gathered). Explain in refined form the question you plan to answer. You will either turn this in during class, fax it, or e-mail it. Mr. Burrow will suggest the appropriate statistical test(s) you can use to complete your project.

#### 6. *Test*

- Determine hypotheses, and perform the appropriate significance test(s).

#### 7. *Summary*

- **DUE AT END OF SEMESTER:** Summarize the results of your project in a written report. The report should briefly review your question and data gathering procedure. It should also state your hypotheses, the test(s) you performed, the critical and test values of your statistics, the result(s) of the test(s), and an interpretation of what the results mean. You should turn this in when you give your presentation (see below.)

#### 8. *Presentation*

- **DUE AT END OF SEMESTER:** Present your results to the class. You will give an oral presentation with essentially the same information that is in your written summary and answer any questions the class members or Mr. Burrow may have. Presentations are typically 3 – 5 minutes long. **You must include at least one visual aid** (chart, graph, etc.) that will help explain your project.

You will not receive letter grades on your prospectus, your progress report, your summary, or your class presentation. Each will be recorded, however, and you will receive an overall grade for the project. The total project is worth about the same as one test.

## Ideas for Project Questions

These were questions used for projects by Mr. Burrow's statistics students in the past few years.

### *Human Resource Management-Related Questions*

- Does the quality of work get better when more workers are involved in a project?
- How do various types of training programs affect the attitudes and performance of factory workers?
- Are there any patterns to employee absence in a company?
- How far do employees at a factory commute to work, and how far would they be willing to commute for a higher wage?
- Does level of education correlate with earnings?
- How important are various benefits in an employee's decision to take or keep a job?
- Are women promoted at a different rate than men?
- Are employees whose native language is not English willing to work harder than native English-speaking employees?
- Do employees at area factories keep their jobs longer than Americans as a whole?
- Are there fewer jobs in geographic information systems in Iowa/Minnesota than there are in the nation as a whole?
- Does personality make a difference in career choice?
- Do age and sex affect efficiency in customer service?

### *Other Business-Related Questions*

- Why do shoppers choose to patronize a particular business?
- Does one telemarketing technique produce better results than another?
- Do certain stocks perform significantly better than the market as a whole?
- Is the stock market more likely to go up on certain days of the week?
- Which form of advertising is most effective?
- What factors affect people's decisions to rent videos?
- What is the best way to reduce your taxes?
- Is Wal-Mart good or bad for business in small towns?
- Is the price for computer operating systems related to how big the operating system is?
- What factors influence people's use of coupons at the grocery store?
- Is a change in the format of a business mailing more likely to bring the desired response from customers?
- Are locals or out-of-towners more likely to patronize a tourist-oriented business?
- Are younger people more likely than older people to give out credit card information online?
- Will following a pattern of investment produce gains higher than the investment fees?
- Do people's insurance deductibles vary by age?
- Which supermarket is cheapest to shop at?
- Are prices different at different Wal-Mart stores?
- Do grocery store customers prefer a chatty checker or a quiet checker?
- What factors affect people's decisions to use a dry-cleaning service?
- Are pennies in general circulation from different years than pennies in a roll from the bank?
- Do teenagers pay for their own car insurance?

### *Education-Related Questions*

- Does the amount of study time affect a student's grades?
- Do drinking and drug use lower a student's grades?
- Which is better: a self-contained elementary classroom or a subject-specific elementary classroom?
- Do students in big classes do worse than students in small classes?
- How effective are the ILCC TV system classes?
- Do people in relationships do better or worse in school than people who aren't in relationships?
- Do students who do well in high school also do well in college?
- Do non-traditional students do better than normal college-age students at ILCC?
- Is there a difference in achievement at the different ILCC centers?
- Does success on the ASSET test predict success at ILCC?
- Did one high school graduating class get significantly better grades than another?
- Are too many students being diagnosed with learning disabilities?

- Does attending pre-school affect success in school?
- Are there any patterns to violence in schools?
- Are girls better students than boys are?
- Do private or public schools produce better results?
- Does behavior affect achievement?
- Do boys misbehave more than girls?
- Are ILCC students different than the country as a whole?
- Do different sexes do better at math and reading?
- Are children with behavior problems more likely to come from families that are on public assistance?
- Do high school juniors and seniors tend to arrive at school earlier or later than freshmen and sophomores do?

### *Health-Related Questions*

- Do health care professionals lead healthy lifestyles?
- Do nurses smoke more than other people?
- Do nursing home residents and nursing home employees have different views on the residents' quality of life?
- How do the views of smokers, non-smokers, and former smokers differ on smoking?
- How closely related are blood pressure and weight?
- Do men or women suffer more heart attacks locally?
- Are the causes of death today different than they were in the past?
- Does seat belt and child restraint use vary by age or sex?
- Do people live longer than they used to?
- What would make teenage smokers quit?
- Do people correctly estimate their loved ones' wishes concerning organ donation?
- Does child abuse predict violence in teenagers?
- Do patients wait longer at the clinic than doctors think they do?
- What factors affect medication errors in a hospital?
- Does the rate of Cesarean sections decrease with pre-natal counseling?
- Does it take longer for a doctor to arrive in the emergency room during the day or night shift?
- Do girls wash their hands more often than boys do?
- Do ILCC students smoke more than the national average?
- Do women smoke more than men?
- Is there a pattern to babies' dirty and wet diapers?
- How does the distribution of ambulance calls in the local area compare to national figures?
- What do care center residents think of a change in recreation policies?
- Does joint pain increase in cold temperatures and/or high humidity?
- Is there a relationship between prostate cancer and baldness?
- Are college men more likely to use marijuana than college women are?
- What factors affect the number of call lights in a hospital?
- Are more babies born in one month of the year than another?
- Does hearing information about marijuana change people's views on the subject?

### *Sports-Related Questions*

- What is the most physically demanding football position?
- What is the toughest sport?
- Does race make a difference in the salary a pro athlete earns?
- Do pro athletes' salaries have anything to do with their performance?
- How well does last year's performance predict how a baseball player will do this year?
- Do different kinds of people have different favorite sports?
- What factors affect success at fishing?
- Is there a pattern to personal growth in strength training?
- How does water affect the strength of fishing line?
- Do black basketball players earn more than white basketball players?
- Do major league baseball tickets cost less in certain leagues or divisions?
- Are Catholic schools more successful at sports than public schools?
- What football position is most likely to win the Heisman trophy?
- Are point guards better free throw shooters than other basketball players?
- Did the designated hitter rule provide more offense in baseball?

- Are upsets becoming more common in the NCAA basketball play-offs?
- Has one division done significantly better in the Superbowl?
- Does the weight of a bullet affect its speed?
- Are male or female high school athletes more likely to get scholarships to play in college?
- Do different races of athletes tend to play different sports?
- Does age affect how well you play softball?
- Do local people have the same favorite sports as the nation as a whole?
- Are men's favorite sports different than women's?

### *Agriculture & Environmental Questions*

- How do short-season corn hybrids perform compared to traditional varieties?
- How has income from grain and livestock compared over time?
- How do the attitudes of small farmers and large farmers compare?
- Are people's attitudes toward hog confinements different, depending on where they live?
- Is global warming really happening?
- Is the weather today more severe than it used to be?
- Do rural areas have a healthier environment than urban areas?
- What factors do farmers consider when choosing equipment?
- How much does rainfall affect crop yields?
- Is there a relationship between corn prices and cattle prices?
- Does water pollution change with weather?
- Do early season varieties of corn yield more than late season varieties?
- How aware are people of global warming?
- Was the winter of 2009-2010 much colder or snowier than normal?
- Do rural areas have a smaller share of the population than they used to?

### *Lifestyle and Recreation-Related Questions*

- What factors affect drinking habits among college students?
- Are men more likely to wear boxers or briefs?
- Do ILCC students drink more or less than national averages?
- Do women's magazines publish more articles about sex today than they did in the past?
- What do men and women see as their ideal mate?
- What does your car say about you?
- Do people actually buy the beer they say is their favorite?
- Do local residents use various high-tech devices more or less than Americans as a whole?
- Do different age groups of people think different words are dirty?
- Do people's attitudes toward sex vary by age?
- Do most area high school and college students practice safe sex?
- What goes into people's decisions to buy a car?
- What do women think makes a man look attractive?
- Which cable movie channels is the most family friendly?
- Do people's color preferences reflect their personalities?
- What sort of people are the most and least tolerant of single mothers?
- How old are people when they first experience drinking, drugs, and sex?
- Are boys more likely than girls to let peers influence their decisions?
- Is the lottery really fair?
- Are "fair" dice really fair?
- Do dice or coins really land randomly?
- Can you make money at a casino?
- Can you learn from experience when playing computer solitaire?
- Are some types of people more likely to answer a survey than others?
- Are people more likely to wear seatbelts on the highway, rather than in town?
- Do older people communicate in different ways than younger people?
- Do different types of people choose different items from vending machines?
- Do different types of people have different amounts of personal space?
- Do working women contribute more time to household chores than their spouses do?
- Do men like dogs better than women do?

- Are boys or girls more likely to have unhealthy or immoral behaviors in high school?
- Do increasing gas prices cause people to change their driving habits?
- Does experience behind the wheel make a difference when taking the DOT Operator test?
- Does age affect milk purchases?
- Are college men more likely than women to get possessions and other trouble with the law?
- Are people more likely to snack when those around them are also snacking?
- What kind of people sit in different places on a plane?
- How far are people willing to travel to gamble?
- Would increasing cigarette taxes make people stop smoking?
- Do computer-based casino simulations have better odds than the real thing?
- Does DARE help decrease teen substance abuse?
- Are private school students more likely to drink than public school students?
- How does a woman's life change when she becomes a mother?
- Do local people own more or less TVs than the national average?
- Does people's perception of time change as they get older?
- Which type of yogurt is most nutritious?
- Are people who watch Fox News more likely to support the war in Iraq than people who watch other networks?
- Are sex offenders more likely to live in big cities or small towns?
- What factors lead to successful weight loss for women at Curves?
- So men like dogs better than women do?
- Are the colors/flavors of Trix cereal evenly distributed?
- Do name brand Lucky Charms have more marshmallow bits than their generic cousins?
- Do men and women tend to get different kinds of tattoos?
- Do M&Ms have the distribution of colors that the company says they do?
- Is there more of one color of Skittles than any other?
- Is there more of one color of Fruit Loops than any other?
- How are people affected when they drink alcohol?
- What is the most popular candy bar?
- Can people tell the difference between Coke and Sam's Choice cola?
- Can boys stuff more marshmallows in their mouths than girls can?
- Does premium popcorn have fewer unpopped kernels than budget popcorn?
- How many licks does it take to get to the center of a Tootsie Pop?
- What factors influence people to support different candidates for President?
- Where do most sex offenders in Iowa live?
- Are some types of people more honest than others?
- How likely are you to get different outcomes in Yahtzee?
- Does experience lead to better play in *Call of Duty*?
- Do men and women prefer to read different kinds of books?
- What type of metal do people prefer for their jewelry?
- Do more men know how to change a spare tire than women?
- What topics are likely to strike different people's interest?
- Do men prefer different kinds of Girl Scout cookies than women?

You are welcome to come up with any question you wish, so long as it adapts itself to gathering data and performing a statistical significance test. Ask Mr. Burrow if you have any questions.

# **Prospectus**

(You may use this form, or you may present equivalent information in your own format.)

- DUE JUNE 2 → You may turn this in during class, fax it, or e-mail it.

Who is working on this project?

NAME(S)

CENTER(S)

What question do you want to answer with your project?

Why is this question interesting or important to you?

If your first choice for a project doesn't work out, what other idea(s) do you have?

How do you plan to gather data for your project?

Using the terms we learned in class, what type(s) of sample and data gathering method(s) will you be using?

What potential difficulties might you have in gathering data?

How could the way(s) you are gathering data distort your results?

What other problems or difficulties do you think you might encounter in completing your project?

If there is more than one person working on this project, how do you plan to divide the work load?

# **Progress Report**

(You may use this form, or you may present equivalent information in your own format.)

- DUE JULY 5 → You may turn this in during class, fax it, or e-mail it. Mr. Burrow will get back to you with appropriate statistical tests you can use to complete your project.

Who is working on this project?

NAME(S)

CENTER(S)

What is question(s) are you are attempting to answer? (Be specific.)

What have you done so far? (If more than one person has worked on this project, specify who has done what.)

What problems have you run into in doing your project?

What else do you plan to do before you finish this project? (If more than one person is working on the project, specify who will be doing what.)

How big is/are your sample(s)?

Have you gathered any demographic information (like sex, age, race, location, etc.)?

Have you found (or can you find) any parameters (such as census information, numbers from the past, expected values, etc.)?

Are there any statistical tests we have discussed that you think would be appropriate for this project? Which? Why?