Instructor: Dr. Chad D. Cotti
Office: Clow Faculty 328
Phone: 424-3013
E-mail: cotic@uwosh.edu
Office Hours: W 11:00 – 12:00, 2:00 – 3:30**

** The scheduled office hours are times during which I will be available to meet with students on a walk-in basis. Students who wish to meet with me at other times are invited to contact me to set up a special appointment. If you set up an appointment to meet with me you are required to show up, missing an appointment can impact grade. No meetings will be scheduled to begin less than 30 minutes before one of my lectures.

The ISBN is 978-0-07-337584-7. The book is required and you will need it during the semester.

Course Website: D2L will be used in this class to distribute homework, answers to the homework, practice exams, as well as provide other materials for class. Grades will be accessible through D2L. You are responsible for all announcements posted.

Required Course Software: SHAZAM econometric software program (available from the economics department) for $2. This software is also installed on all 4 computers in the Economics Student Lounge in CF 329.

Course Format and Objectives: Class time will consist of a combination of lecture, discussion, and related exercises. This course is a course in applied economic research. In this course you will be doing your own research project, and in the process become acquainted with some of the basic statistical techniques most used by empirical economists. By the end of the course you should be able to:

1. Understand the theoretical foundations of regression analysis;
2. Understand how to collect and organize data as well as learn about different sources of data and how to use them;
3. Develop your ability to use statistical models to analyze economic activities and gain insight into consumer and producer behaviors;
4. Understand how to form an economic research question; and
5. Learn how to report statistical information.

In addition, I hope that you will develop a deeper understanding of statistical analysis, and be able to both think critically about statistical information (in the news, in magazines, in data) and correctly identify how and when to use statistics to understand real world events, in order to gain greater understanding of why things happen. Thus, in addition to the above objectives, I hope you will

6. Be able to identify whether “good” statistics is being used to explain economic events in the news. Is the reporter accurate? Is the politician correctly representing how the economy works? Have the numbers been reported in a way that is accurate?
7. Identify what statistical tools or models to apply to different situations.
8. Discuss how we evaluate different policies and governmental programs.
9. Be able to explain what kind of data you would need to evaluate an economic policy or business plan.
Grading:

Your course grade will be based on total points earned, not need.

- There will be 2 exams, each accounting for 25% of your grade.
- The final research paper, plus related research paper drafts, bibliography, presentation, etc are worth 35% of your grade.
- And several homework assignments worth the remaining 15% of your grade.

Note: Only in extreme circumstances will make up exams be given. Exam scores maybe curved at my discretion. For this reason, once final course grades have been posted they will not be changed, except in the case of an error.

SCALE

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<th>Grade</th>
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Course Policies

Policy on Homework and Exams:

1. Homework assignments are designed to help you learn how to apply the material presented in lectures. You are permitted and encouraged to discuss course material, including homework, with other students. However, you are expected to turn in your own individual solutions. Working with others is intended to clarify ideas, concepts, or technical questions, NOT to simply get the correct answer. Understand that if you take short cuts, it will catch up with you during the exams.

2. Late homework or research papers will not be accepted.

3. During exams the use of cellular technologies and computers are expressly prohibited.

Attendance Policy:

Attendance is not mandatory, but promptness is required. Overall, your presence in class is highly recommended, but is not required. Attending class regularly can only benefit your overall class performance. It is your responsibility to keep informed of class announcements or course changes that may be made during lectures. Attendance will be occasionally taken for my records. Also, entering class late or leaving early is extremely rude and disruptive to your classmates and the flow of the lecture. If you must leave class early please notify me prior to the beginning of the session.

Honor Code:

All honor code rules of the university are in effect – even if not explicitly mentioned on each assignment/exam.
Expectations:

- Students are asked to come to class prepared. At the least, please skim over your notes from the last class session to remind yourself where we are. Obviously, it would be better if you would do more than that—read all assignments, study your notes, identify questions you have, etc.

- Please come to my office hours or make an appointment to resolve any concerns or difficulties you may have at any point during the semester. The sooner you approach me about concerns the better off you will be and the easier they will be to resolve, and the happier you will be with the outcome.

Course Outline and Topics:
Note: This outline is meant as a guide and subject to change.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Read</th>
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<tbody>
<tr>
<td>1</td>
<td>Sept. 9: Introduction</td>
<td>Chapter 1</td>
</tr>
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<td>2</td>
<td>Sept. 14-16: Stats Review</td>
<td>Appendix A, B</td>
</tr>
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<td>3</td>
<td>Sept. 21-23: Stats Review</td>
<td>Appendix C</td>
</tr>
<tr>
<td>4</td>
<td>Sept. 28-30: Stats Review</td>
<td>Appendix D</td>
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<td>5</td>
<td>Oct. 5-7: Simple Regression</td>
<td>Chapter 2</td>
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<td>6</td>
<td>Oct. 12-14: Regression Inference</td>
<td>Chapter 3</td>
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<td>7</td>
<td>Oct. 19-21: Multiple Regression/Exam I</td>
<td>Chapter 4</td>
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<td>8</td>
<td>Oct. 26-28: Nonlinearity</td>
<td>Chapter 5</td>
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<td>9</td>
<td>Nov. 2-4: Dummy Vars</td>
<td>Chapter 6</td>
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<td>10</td>
<td>Nov. 9-11: Evaluating Models</td>
<td>Chapter 7</td>
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<td>11</td>
<td>Nov. 16-18: Multicollinearity</td>
<td>Chapter 8</td>
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<td>12</td>
<td>Nov. 23-25: Project Day/Thanksgiving</td>
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<td>13</td>
<td>Nov. 30-Dec.2: Heteroskedasticity</td>
<td>Chapter 9</td>
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<td>14</td>
<td>Dec. 7-9: Logit/Exam II</td>
<td>Chapter 12</td>
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<td>15</td>
<td>Dec. 14-16: Presentations</td>
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Research Project Details

In addition, as stated above, since this is a course in economic research, you will be doing your research project in pairs. Think of your econometrics project as a senior research paper in economics. This is a chance to apply what you’ve learned in other classes about economic theory to the real world using data. This project will ultimately be approximately 15 pages long, including tables. There are an infinite number of projects and topics that can be studied—just to get an idea, try looking at *National Tax Journal, Journal of Public Economics, Contemporary Policy Analysis, Journal of Labor Economics, Sports Economics, Education Economics,* and the *Journal of Health Economics* for examples.

The choice of the project is up to you, but it must involve a cross sectional study using multiple regression techniques. Some examples of possible projects are:

- Any project that compares some attribute across cities or counties (like crime rates, etc);
- Any project that compares some policy across states (like gun control laws or the death penalty or economic or prison growth rates);
- A project that compares policies (economic growth, education, infrastructure, health, women’s rights, human rights, trade) across countries;
- A project that compares returns to education or wages or investment across industries;
- A project that compares investment returns or other performance measures across corporations;
- A project that compares family incomes or education;
- A project that compares sports revenues or other characteristics of sports teams;
- A project that compares health outcomes across people.

In your study, you will examine how a single dependent ("Y") quantity variable is related to at least 3 separate independent ("X") quantity variables (of which one should be a dummy or category variable). For example, you may choose to investigate how infant mortality rates in the 50 states (your Y variable) depend upon per capita income, per capita health care expenditures, and percent health insurance coverage in those states. Choosing more than 3 independent quantity variables will usually result in a better study, and will make it easier to earn a higher grade on your paper. If you are taking the course for Honors or Graduate credit, or if you want to be eligible to be nominated to present your study at an Undergraduate Research forum in the Spring, or to have your study submitted for publication in an undergraduate research journal, your study must have at least 5 explanatory quantity variables.

Examples of topics:

- Why some countries have faster economic growth, better schools, higher incomes, etc. than others;
- The relationship between free trade and economic growth across countries;
- Regional/racial/gender differences on returns to education or wages in any industry;
- Impact of college athletic performance on applications, graduation of athletes, money from alumni;
- Crime, prison populations, income, and the state of the economy;
- How compensation effects injury claims and length of time off work;
- Job training and productivity, wages, employment;
- Any project that compares some policy across states (like gun control laws), or attempts to figure out what characteristics make a state more likely to be in a huge budget deficit;
- A project that compares policies (education, control of AIDS spread) across countries;
- A project that compares sports revenues to the characteristics of the sports team.

There is also a binder of student research papers in CF 327. Again, these can be used to give you an idea of how to lay out your paper.
**BUILDING YOUR PROJECT:**

**Step 1 (The Question):** Formulate a question you want to ask. You can apply a question/model someone else did to different data, or add a variable to a regression that you think has been left out. Make sure you can state this question in a single sentence. For example: Does graduating from college lead to higher lifetime earnings for professional football players? This would be an application of the returns to education literature applied to a different group of people with different data. Other examples of questions might include: Do social programs that educate women about the use of condoms reduce the spread of HIV and AIDS in African countries? What factors determine the likelihood of a woman pursuing higher education in Bolivia? Does the length of criminal sentences reduce the hours people spend in criminal activity? Does the threat of the death penalty reduce homicides in states that have the death penalty?

*The write up of your question should be one or two paragraphs—what is the question, why is it important? What variables do you think you will need to find? Why?*

**DUE: Oct. 7th**

**Step 2 (The Literature Review):** Write a literature review of at least THREE articles you chose that are related to your question from Step 1. A literature review is a discussion of the current academic views and research on a particular topic (in this case it should be related to your topic). The review should cover the “major” articles in the area. If a single article is referenced over and over, then you know it’s a major article. It will also be useful to limit yourself to research done since 1990, since it is important in economics to be current. For a professional example, see the literature review addressing the topic of “Age Discrimination in US Labor Markets”, which is available on the D2L. The review must give a coherent overview of key findings, and should be organized in terms of the findings. Simply listing papers, with short descriptions of what is in each paper, is **not** satisfactory. You may be guided in your literature review by finding answers to some of the following questions:

1. What are the main concepts and ideas in the book or article you have read?
2. Do the author's ideas agree with or corroborate ideas you have come across in other articles or books? Or do the ideas differ from them? What are the points of agreement and/or differences?
3. How do you explain the differences in the viewpoints?
4. Is there agreement among the authors on the definition of concepts and angles of perception?
5. Which of these concepts, ideas and conclusions do you find relevant to your own work and why?
6. What hypotheses can you derive from these writings for your own work? As a reminder, hypotheses are **a priori** or tentative explanations of the phenomenon under investigation or prediction about its future development.

*Write a draft of your literature review should be 3 to 5 pages in length.*

**DUE: Oct. 21**
Step 3a (The Model): Specify a preliminary economic model for your project. Using economic theory (and common sense) write down an econometric model that describes how the dependent variable is related to the independent variables of the model. You model must have at least 3 independent variables, one of which must be a dummy or categorical variable, and one of which must also be included as a quadratic term (this does not count in the original 3).

Turn in your economic model with discussion. It should be 2 to 3 pages in length and include detailed descriptions of the variables, how you think they relate to your dependent variable (positively or negatively), and where you think you will be able to find the data.

DUE: November 4th

Step 3b (Gather Data): Find the data for you variables. Sometimes you will have to modify your model to fit the data that is available. There are a number of data sources listed on D2L including the Bureau of Labor Statistics (BLS) and FedStats.

Turn in Excel printout of your data set

DUE: November 4th

Step 4 (Prepare and Understand Your Data): Load your data into SHAZAM. Describe the data. Create a table that indicates what each variable is, how it is measured, and the mean and standard deviation of each variable. In some cases you might want to look at correlation coefficients between variables or test an individual variable’s mean. For example, you could do a t-test of whether women earn less than men in a sample of lawyers. Write up your data description.

Data description and your table should be about 2-3 pages in length, including the table.

DUE: November 11th

Step 5 (Run Preliminary Estimation): Refine your preliminary model; then run the regression you indicate. Analyze the results. Test the results and the model specification. Consider different forms of specifying the model for the regression—quadratics, logs, dummy or categorical variables. Conducting F- or Wald-tests.

You don’t need to turn anything in here, but you do need to check your regression specification with me by due date. So, print off your results and stop by my office.

DUE: November 18th

Step 6 (Draft Results of the Paper): Write up and discuss your results (a few pages) and make tables that correspond. Be sure to report your regression results, the standard errors, the number of observations and the R². In the text be sure to discuss the tests you ran (t-tests on individual variables, F-tests, checking for heteroskedacity or multicollinearity) and the results. Most papers report the significance of each individual variable. Look at other papers for inspiration.
**Step 7 (Conclusions):** Write up your conclusions. What did you find? What is the answer to your question of interest? If you had infinite time and money, what else would you like to include in your model and study? How could you extend this model in the future or what does it suggest for future research? Can you draw any policy conclusions or make any policy recommendations based on your research?

**Step 8 (Final Paper):** Begin to tie everything together into a draft of a final paper. That’s it in a nutshell. We’ll talk in detail about each step in class.

Turn in final paper.

**DUE: December 16th**

Papers can, of course, be turned in early. I am happy to look at as many rough drafts as you like.

**Step 9 (The Presentation):** Give a 10-15 minute PowerPoint presentation on your paper. This should be a brief synopsis of your paper.

For example:  
1) Start with motivation: What is your question? Why is it interesting? 
2) Very briefly discuss past literature. What has been done and found on this issue. 
3) Discuss your model 
4) Discuss your data 
5) Present and discuss your results. This is the key part of your presentation. 
6) Conclude. What do your findings mean?

**NOTE:** It is easy to get behind or put off your paper, which usually results in disastrous things happening. To try to prevent that, I’ve assigned due dates for 6 early parts of the paper shown above. **You will credit per day, per assignment for turning in materials late.**
WRITING YOUR FINAL ECONOMETRIC REPORT:

An econometric research paper is not unlike any other paper: it has an introduction, a body, and a conclusion. Unlike other papers, however, it will contain information on your statistical procedures and findings, which must be presented in a way that is both sufficiently complete to be replicable and sufficiently summarized to be easily readable. The typical components of an econometric paper are:

A. **The Introduction:** In this section you describe the research topic you are exploring, and why it is an important or interesting topic.

B. **Literature Review:** You should provide background on your research, such as what other researchers have looked at and found. Your earlier literature review (Step 2) should be useful here.

C. **Methodology (description of model and procedures):** You explain the model you have investigated. The econometric model(s) to be estimated will be specified, usually using a formula like: \( GNP_t = a + bGS_t + dTx_t + gMS_t + e \). The more sophisticated papers will include an economic model to justify the variables and specification used; I would expect you to at least present your intuition as to why your specification makes sense. (taken mostly from what you turned in for Step 3a, but your model may change, of course). I would also expect you to compare your procedures with those of the papers you discussed in your literature review.

D. **Discussion of the Data:** Discuss the data utilized in your model, where it came from. Provide descriptive statistics table here. (Work from Steps 3b and 4 are helpful here.)

E. **Presentation of Statistical Results:** Usually your results are presented in tabular form, especially if two or more specifications were estimated (see next page). It is mandatory to report either t-statistics or standard errors for each of your estimated coefficients. Usually such summary measures as \( R^2 \) or F statistics are reported for each estimated equation as well. (Step 5)

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<tr>
<td>GS</td>
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<td>2.05</td>
</tr>
<tr>
<td></td>
<td>(2.51)</td>
<td>(2.06)</td>
</tr>
<tr>
<td>GS^2</td>
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<td></td>
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<tr>
<td></td>
<td>(3.72)</td>
<td></td>
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<tr>
<td>TX</td>
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<tr>
<td></td>
<td>(-1.85)</td>
<td>(-1.41)</td>
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<tr>
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<tr>
<td></td>
<td>(3.71)</td>
<td>(4.09)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.63</td>
<td>0.71</td>
</tr>
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</table>

F. **Interpretation of Statistical Results:** Often included in with the presentation of the numerical findings, this is the most important part of the paper. What does the coefficient for GS (of 5.72) in Equation 1 mean? How do you interpret the fact that when GS^2 was added as a variable, it had a positive and significant coefficient, while the coefficient for GS fell to 2.05? You should be able to present an economic story that explains your numerical results, that makes them make sense. You should also compare your findings to those of the authors whose studies you reviewed. (Steps 5 and 6)
G. **Model Evaluation**: A discussion of tests employed and/or alternative specifications used would appear in this section. Keep this description brief. **Your paper should be a report of what you found, not a diary describing everything you did.** (Step 6)

H. **Conclusion**: This section summarizes the papers findings. If the hypotheses of (A) and the interpretations of (D) have not already been compared and reconciled, that should be done here. You should also discuss any policy implications of your results. It is also common to discuss any ideas for future research that this study suggests; i.e. if I paid you $2000 to do the study all over again, how would you (with 20/20 hindsight) do it differently? Any other concluding remarks may also appear in this section. (Step 7)

When you read the research papers you’ll review in the economic journals, observe how they contain in some way, shape, or form each of these seven sections. Then use them as models in writing your own papers. There is also a binder of student research papers in CF 327. Again, these can be used to give you an idea of how to lay out your paper.