# *Economics 671, PhD Econometrics I*

*Fall 2014. Course homepage: «http://www.econ.iastate.edu/~gcalhoun/671»*

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| OH | Tu 2–3:15 | TBD |

Table 1: Instructor and TA contact information.

Welcome to Econ 671! This class has three goals. You are going to study and learn fundamental techniques in econometrics and statistics so that you can use them in your future research. You are also going to learn some of the basic theoretical concepts in econometrics so that you can understand new techniques when you encounter them in future classes and later in your career. And, finally, you're going to learn how to use a computer to do statistical and econometric analysis.

If you have questions about the course material, the best times to address them are in the scheduled class meetings or during office hours. We can probably resolve questions or concerns about the course administration over email, but if you have urgent questions please call me or stop by my office.

## *Textbooks and software*

This class has two required textbooks, [CB02] and [Gre12], and two recommended textbooks, [Gal97] and [Fre09].[1] These are all available at the university bookstore but can be purchased cheaper online. There are a few other required readings that are available through the course homepage. Additionally, [Cal14] is a disorganized collection of notes from previous years that I've taught this class and is available for free download online at «http://www.econometricslibrary.org». These notes are neither required nor necessarily recommended, but you may find them helpful. The course *Reading guide* has a short overview of the different readings.

[1] There is a bibliography with full citations at the end of the syllabus.

You are also going to start to learn computer programming in this class. The TA will teach R, a specialized language that's designed for statistical analysis, in some of the Friday discussion sessions.[2] You may also want to look at Julia and Python,[3,4] they are also free software and are also designed for statistical and scientific computing, but have different strengths than R.

[2] R can be downloaded for free from «http://www.r-project.org».

[3] Julia is available for free at «http://julialang.org».

[4] For Python, you'll especially want the packages at «http://www.scipy.org».

## *Grading*

This course uses the *Team-Based Learning* (TBL) instructional strategy, which is probably different from instruction styles you've had before. Most of the content is covered individually with readings and short problems completed outside of class. Most of the activities and projects, which would conventionally be done as out-of-class homework and group projects, are done in teams during class.

There will be six short multiple-choice *Readiness-Assurance Tests* (RATs) at the **beginning** of each unit of material; these will be taken as individuals first, then as a team. There will also be six main team projects at the end of each unit, and an individual midterm and final exam. For team tests and projects, all members of the team will receive the same score.

Scores in three areas will determine the grades: *Individual Performance*, *Team Performance* and constructive behavior as determined by *Peer Evaluations*.

### *Setting Grade Weights*

Representatives from each team will set the percentage of the course grade that will be determined by scores in each of the major performance areas during the first class period. Team representatives will also decide on the relative weight of the Readiness Assurance Tests and the exams within the Individual Performance area.

Grade weights will be set for the class using the following procedures:

1. Each team will set preliminary weights and select a member to meet with other teams' representatives.
2. Team representatives will meet in the center of the room and develop a consensus (i.e., every representative has to be in agreement) about the grade weights for the class as a whole.
3. The only limitations on your grade weight decisions are listed in the table:
   (a) A minimum of 20% of the total grade must be assigned to each major performance area.
   (b) Within the individual performance area, at least 20% of the grade must be based on each exam and on the total of the individual RATs.

Table 2 summarizes these rules and provides space to enter the weights that you all agree on.

### *Peer evaluations*

Each individual will rate the contributions all of the other members of their teams during the final exam. Individual Peer Evaluation scores will

| Component | Weight | Min. (%) | Max (%) |
|---|---|---|---|
| **Individual performance** | ____ | 20 | 60 |
| Individual RATs | ____ | 20 | 60 |
| Midterm exam | ____ | 20 | 60 |
| Final exam | ____ | 20 | 60 |
| **Team performance** | ____ | 20 | 60 |
| Team RATs | 30% | | |
| Team projects | 70% | | |
| **Peer evaluations** | ____ | 20 | 60 |

Table 2: Weights for each component of the course grades — the specific weights will be determined by the class as described in the syllabus. The three components of "individual performance" must add up to 100%, with a minimum weight of 20% on each exam and on the overall individual RAT scores. The weights of the three main performance areas (in bold) must also add up to 100% and must each be at least 20%.

be the average of the points they receive from the members of their team. Assuming arbitrarily that: 1) constructive behavior is worth 10 points, and 2) that there six members in a team, an example of this procedure would be as follows:

Each individual must assign a total of 50 points to the other five members in their team. Raters must differentiate some scores in their ratings (This means that each rater would have to give at least one score of 11 or higher — with a maximum of 15 — and at least one score of 9 or lower — with a minimum of 5). The Team Maintenance scores will produce differences in grades only within teams. As a result, teammembers can't help everyone in their team get an A by giving them a high peer evaluation scores. The only way for everyone in a team to earn an A is by doing an outstanding job on the individual exams and team exams and projects.

*Determination of final grades*

The final grades will be determined as follows:

1. A raw total score will be computed for each student in each major performance area. (In the Individual Performance area, this will be a weighted combination of the sum of the individual Readiness Assurance Test scores and the final exam score, in the Team Performance area, this will be the sum of the scores on each of the graded team assignments and the Team Maintenance score will be the average of the peer evaluations received from the other members of his or her team.)

2. Students' total scores will be computed by multiplying the raw scores

| Topic | RAT | Required reading |
|---|---|---|
| Probability | 9/02 | [Gre12] B, D; [CB02] 5.1–5.3, 5.5 |
| Statistical estimation | 9/23 | [CB02] 7, 10.1, 10.2 |
| Statistical inference | 10/07 | [CB02] 8, 9, 10.3, 10.4 |
| Linear regression | 10/21 | [Gre12] 2–4, 5.1–5.7, 9.1, 9.2 |
| Regression modeling | 11/11 | [Gre12] 5.8–5.11, 6, 9.1–9.3, 10.1–10.3; [GH07] 6 |
| Program evaluation | 12/02 | [Gre12] 8.1–8.3; [Fis26]; [Fre91]; [IW09] 1–4, 5.1–5.3, 5.11–5.13; [Rub05]; [Ros09] 1, 19, Summary |

| Exam | Date | Exam time |
|---|---|---|
| Midterm | Fri. 10/24 | 9:00a – 11:00 |
| Final | Mon. 12/15 | 7:30a – 9:30 (sucks, I know) |

Table 3: List of major units and required reading for the class. There is a bibliography with full citations at the end of the syllabus. The individual chapters and articles are available on on the course homepage (or on Google).

in each area by the grade "weight" set by the class (see above).

3. Course grades will be based on each student's standing in the overall distribution of total individual scores within the class. The actual impact of any score on an individual student's final grade depends on both his or her actual score and also how high or low he or she scores relative to other members of the class. The conventional practice of 90% is an A, 80% is a B, etc. simply does not apply.

## *Planned schedule*

The course is broken up into six parts with required reading for each one, as listed in Table 3. Additional ungraded prep work may be assigned as the semester goes along.

The Friday meetings will usually cover programming and software development. They will often be unrelated to the main class — think of them as a parallel class — but we will sometimes use those sessions for review or to continue a team project. A tentative plan for the sessions is listed in Table 4.

## *License and copyright*

| First half of semester | Week | Second half | Week |
|---|---|---|---|
| Intro to computing resources | 1 | Intro to the Unix shell | 10 |
| Programming in R | 2 | Version control with Git | 11 |
| Graphics in R | 3 | More Git | 12 |
| Intro to data management | 4 | *Class meeting* | *13* |
| More data management | 5 | TBD — discuss with TA | 14 |
| LaTeX | 6 | *Final exam review* | *15* |
| Reproducible research & Knitr | 7 | | |
| *Midterm review* | *8* | | |
| *Midterm* | *9* | | |

Table 4: Tentative list of topics covered during Friday review session. Classes that are *emphasized* will be held in the regular classroom; the rest will be held in the computer lab.

## *University policies*

The following policies apply to *every* course at Iowa State University. They are listed here for your convenience and reference.

### *Academic dishonesty*

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office, «http://www.dso.iastate.edu/ja/academic/misconduct.html».

### *Disability accommodation*

This material can be provided to you in alternative format. Anyone who anticipates difficulties with the content or format of the course due to a physical or learning disability should see me immediately in order to work out a plan. You may also want to contact the Disability Resources (DR) office, located on the main floor of the Student Services Building, Room 1076 or call them at 515-294-7220.

### *Dead week*

For academic programs, the last week of classes is considered to be a normal week in the semester except that in developing their syllabi faculty shall consider the following guidelines:

- Mandatory final examinations in any course may not be given during Dead Week except for laboratory courses and for those classes meeting once a week only and for which there is no contact during the normal final exam week. Take home final exams and small quizzes are generally acceptable. (For example, quizzes worth no more than 10 percent of the final grade and/or that cover no more than one-fourth of assigned reading material in the course could be given.)

- Major course assignments should be assigned prior to Dead Week (major assignments include major research papers, projects, etc.). Any modifications to assignments should be made in a timely fashion to give students adequate time to complete the assignments.
- Major course assignments should be due no later than the Friday prior to Dead Week. Exceptions include class presentations by students, semester-long projects such as a design project in lieu of a final, and extensions of the deadline requested by students.

*Harassment and discrimination*

Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020, or the Office of Equal Opportunity and Compliance at 515-294-7612.

*Religious accommodation*

If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

*Contact information*

If you feel that any of your rights as a student have been violated, please email «academicissues@iastate.edu».

*References*

[Cal14] Gray Calhoun. *Core Econometrics*. Econometrics Free Library Project, «http://www.econometricslibrary.org», 2014. Version 0.7.2.

[CB02] George Casella and Roger L Berger. *Statistical Inference*. Duxbury Press, 2nd edition, 2002.

[Fis26] R.A. Fisher. The arrangement of field experiments. *Journal of the Ministry of Agriculture of Great Britain*, 33:503–513, 1926. Available at «http://digital.library.adelaide.edu.au/dspace/handle/2440/15191».

[Fre91] David A. Freedman. Statistical models and shoe leather. *Sociological Methodology*, 21:291–313, 1991. Available at «http://www.jstor.org/stable/270939».

[Fre09] David A. Freedman. *Statistical Models: Theory and Practice*. Cambridge University Press, revised edition, 2009.

[Gal97] A. Ronald Gallant. *An Introduction to Econometric Theory*. Princeton University Press, 1997.

[GH07] Andrew Gelman and Jennifer Hill. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press, 2007.

[Gre12] William H. Greene. *Econometric Analysis*. Prentice Hall, 7th edition, 2012.

[IW09] Guido W. Imbens and Jeffrey M. Wooldridge. Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, 47(1):5–86, March 2009. Available at «http://ideas.repec.org/a/aea/jeclit/v47y2009i1p5-86.html».

[Ros09] Paul R. Rosenbaum. *Design of Observational Studies*. Springer, 2009.

[Rub05] Donald B. Rubin. Causal inference using potential outcomes. *Journal of the American Statistical Association*, 100(469), 2005. Available at «http://www.jstor.org/stable/27590541».