HOW TO CHOOSE COURSES IN THE FIRST 4-WEEK SESSION

Guide to Course Selection: First 4-Week Session

When you enroll with the ICPSR Summer Program through the on-line registration system you choose a set of courses to participate in this term. These selections should be based upon your previous formal course work in math and statistics, your current capabilities, and your research goals. Sometimes individuals initially choose courses based upon the title of the class, without fully comprehending the content of our courses. Sometimes courses are chosen based upon what an advisor or colleague suggested. These colleagues may mean well, but may be choosing your courses based upon what they already know, what they wish you to know, or what they want you to know when you return home (to help them!). Below you will find a course by course discussion of what is involved to ensure the successful completion of any given class. Please take some time to review these comments. You will have an opportunity to discuss your course elections with a counselor at the in-person registration on the first day of the first session. Rest assured that we will try and help you select a set of classes that best meets your personal and professional needs.

Computing

The Intro to Computing lectures will cover basic overviews of SPSS, STATA, and SAS (in that order). The different instructors of the stat workshops employ various software packages. You may not know which one you need until you go to your first stat class session. We recommend that everyone who can, go to at least the first class of the Computing lectures to get the schedule for the entire course, and also to learn about the basics of the Summer Program computing environment. Also you may already know how to use the stat package that will be employed in your stat class. Therefore you may only wish to attend the computing lectures in order to add knowledge of one of the other software packages.

For those interested in the R/S software (utilized in the MLE, Bayesian, and Regression III) workshops, those lectures will be offered in the late afternoon, in a separate presentation series. The R lectures are intended for those with little or no prior experience with this software.
Mathematics

We recommend that everyone attend a math lecture series. The choice will depend upon your previous math background and the stat courses that you will be attending. Individuals with little or no background in math (at least since your undergraduate days) should elect *Mathematics for Social Science I*. This is usually the course that complements best the participation in the Intro to Stat and/or the Regression I workshops.

*Mathematics for Social Science II* covers brief overviews of two topics: matrix algebra and calculus. The knowledge of matrix algebra is essential for all of the stat workshops from Regression II, all the way up though Regression III, Scaling/Dimensional, MLE, and Bayesian. The calculus is useful (but not absolutely essential) for the MLE and Bayes courses.

Little or No Stat/Math

If you have had little or no stat then there is only one place to start: at the beginning. Please do not fret about this. It is the one thing we all have in common. We all have to start at the first step, which in our case is *Intro to Statistics and Data Analysis I*. If you are staying for the entire 8 week program, then you will take *Intro Stat II* in the second session. In addition to the afternoon stat course you should also elect to attend the *Math for Social Science I* lectures. Many individuals stumble in their first stat course because they have been away from math for a long time. So it will actually help your stat learning to also refresh (or learn anew) various math skills. In addition you should attend at least the first week or so of the *Intro to Computing* lectures to learn the SPSS software, which you will need to know in order to do your homework in the stat course.

Regression Analysis

There are three courses that cover multiple regression analysis: I, II, III. Each has a different intended target audience. *Regression I: Introduction* is best suited for those who have had a basic introduction to statistics that covered up to the beginning of simple bivariate regression. The course covers a straight forward presentation of how to use and interpret multiple regression (in scalar notation). It is best suited for those who have not been exposed to the topic before or who struggled with it in a previous course.

*Regression II: Linear Models* is the single most popular course in the Summer Program and the class that is most appropriate for many graduate students. Most students and professionals have had a similar course probably during their first or second year in graduate school. Frankly many of these courses elsewhere are not of the same quality as that offered at ICPSR. Either the instruction or the topics covered may not be comparable. In most cases individuals find that a second exposure to this material solidifies the techniques and clears up many of the mysteries left hanging in previous courses on these topics. It is almost certainly the case that your previous exposure to the
material, no matter how well taught, did not include a presentation of multiple regression in matrix notation, and may not have always included what to do about the violations of the various linear models assumptions. This course presents both the mathematical and applied approaches to the material. Many find it a wonderful course if for no other reason than it is provides a useful review.

Regression III: Advanced Methods goes beyond the standard multiple regression course, into new and modern and alternative forms of analysis using graphical, nonlinear, and nonparametric techniques. This course is intended for more advanced scholars and specialists and does cover some rather esoteric but highly useful perspectives.

Beyond Regression: More Advanced Multivariate Methods

All of the courses discussed here and below assume a very strong background in multiple regression and a working familiarity with basic matrix notation; those without this background will likely struggle in these classes.

Maximum Likelihood Estimation (MLE) is the most popular advanced course in the curriculum. It is often consider by many participants (especially those in Econ and Poli Sci) as the next most needed and useful set of techniques beyond those covered in regression. Among other topics covered it includes logit and probit models for categorical and ordered dependant variables.

Scaling and Dimensional Analysis creates conceptualized geometric/spatial representations of data arrays. This involves data reduction, dimensionality (e.g. left-right, or liberal-conservative), and measurement issues. Techniques covered include scaling, factor analysis, and unfolding and multidimensional modeling. (NOT OFFERED IN 2010)

Bayesian Methods is a relatively new and increasingly popular methodology, including utilizing likelihood inferences and prior and posterior distributions. The course assumes a very thorough understanding of multiple regression, matrix algebra, as well as MLE.

Mathematical Modeling: Game Theory and Rational Choice

This summer we are offering the basic and advanced Game Theory and the Rational Choice workshops all in the first 4-week session. In essence this clustering of courses in the same time frame creates a mini-curriculum in mathematical modeling. Basic Game Theory introduces the analysis of strategic choice and a broad overview of non-cooperative games. The Rational Choice course investigates the ways that actions taken by ‘rational’ decision-makers often lead to stable aggregate outcomes. The first game theory course and the rational choice class assume no prior modeling experience but do assume a reasonable math background and at least one course in basic stat. The Advanced Game Theory class (covered in the second 2-weeks of the session) assumes mastery of
the basic game theory material, and extends the paradigm to include games of incomplete information and dynamic games.

Substantive Courses: History, Ethnicity, Criminology

There are three courses that start from a substantive perspective and then layer in and supplement with quantitative reasoning and analysis techniques. The *Race and Ethnicity* and the *Crime and Criminal Justice* courses had separate and competitive application routes. If you were not specifically admitted to either of these classes then you can not elect to participate in them.

The *Historical Analysis* class is open to anyone with an intellectual curiosity about investigating non-contemporary social phenomena through the analysis of quantitative evidence. *(NOT OFFERED IN 2010)*

The Blalock Lectures on Advanced Topics

This series of lectures covers advanced topics in quantitative methods, material often not yet exploited in the mainstream social science literature. Participants should attend as the topics are of interest and as their schedules allow. Topics covered in this session include: data mining, statistical graphics, innovative regression techniques, how to publish in a journal, how to apply for a grant, among other subjects.

How Many Courses?

Summer Program participants are often tempted to elect many more courses than they can safely navigate. While this might be a tempting approach, it might not be the most rewarding. It is physically possible to attend classes from 9am until 7:30 pm. Those who attempt such a schedule usually experience intellectual (and emotional) burn-out. Summer Program courses are just too dense, too demanding, and too time consuming for that strategy to be successful.

Most participants will need to take one math lecture series, and at least a couple of weeks of computing lectures. It is also possible to take a morning class (9-11am) as well as an afternoon class (2:30-4:30). We would recommend not taking both afternoon and morning classes, unless one of those courses is a review of previous material covered elsewhere, or the two courses complement one another. For example electing Regression II (for review) and MLE is a popular schedule. Scaling/Dimensional (for review) and
Bayesian might also work out. The History, Ethnicity, Criminology courses are often naturally paired with an afternoon stat class such as Regression II. Electing the entire Game Theory sequence (4 hours per day) may not leave much time and energy for any other courses (with the possible exception of adding the Rational Choice class).

Remember all classes have homework, reading assignments, and computer assignments, in addition to the time spent in class. Passively going to a class, without also keeping up with the homework assignments, is most likely going to lead to a less than satisfactory experience.

If you do elect to take two workshops, you should fairly quickly designate one of them as primary and one as secondary for your efforts. The worst thing that you can do is to only finish half of two (or more) courses. You want to designate at least one course as the highest priority, that means no matter how tired you get as the summer wears on, you will always keep up with the work in that class.

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We hope that you find these comments useful when you are electing or amending your Summer Program course schedule. Please do not hesitate to ask or consult or email with the staff during this process.