Summer 2024

UNIVERSITY OF MARYLAND
Department of Economics

INGMAR R. PRUCHA

Office: Tydings Hall 3147A
Lecture: Tawes Hall 1100

	Wednesday, July 24 – Friday, July 26:	9:00am-11:45 and 12:45-3:30pm
	Monday, July 29 – Thursday, August 1:	9:00am-11:45 and 12:45-3:30pm
	Friday, August 2	9:00am-11:45am

Office Hours: by appointment.
Email: prucha@umd.edu

Teaching Assistant: Weizheng Lai
Office: Tydings Hall 4101D
Discussion Session: 4:00-5:15pm after lectures (tentatively)
Office Hours: by appointment
Email: laiwz@umd.edu
Phone: +1-240-413-0847

INTRODUCTION TO PROBABILITY AND STATISTICS

Preparatory Summer Course for Econometrics Sequence

COURSE DESCRIPTION

This course provides an introduction to basic concepts in mathematical statistics and lays a foundation for a rigorous discussion of econometric methods. Topics include: probability measure, random variables, density and distribution functions, expectations, moment generating functions, conditional distributions, independence, distribution of functions of random variables, parameter estimators, hypothesis testing, sufficient statistics, and (if time permits) asymptotic distribution theory. This course is offered in the summer and is intended to help students fulfill the probability and statistics prerequisite.

ASSUMED REQUIREMENTS

Students are assumed to have a good mathematical background especially in differential and integral calculus.

ADVICE

If you are only somewhat familiar with the topics covered by the course at the level of the textbooks listed below it is strongly recommended that you prepare yourself for the course by reading the textbooks in advance, working through sample problem sets and sample exams, etc., available on:
http://econweb.umd.edu/~prucha/Probability_Statistics.html
In terms of hours of lectures, the summer course is comparable to a regular one-semester course. However, given the compressed nature of 1 ½ weeks of instruction, it will be very difficult for you to absorb the material if it is very much new to you. It is hoped that the course will strengthen your knowledge to a level that is needed for a successful

completion of the econometrics sequence. For further details regarding the Probability and Statistics prerequisite see my teaching website or contact the Department.

PRINCIPAL TEXTS

HOGG, R.V., McKEAN, J.W., and A.T. CRAIG, Introduction to Mathematical Statistics, Seventh Edition, New York: Prentice Hall, 2012. (HMC)

CASELLA, G., and R.L. BERGER, Statistical Inference, Second Edition, Duxbury Press, 2002. (CB)

SUPPLEMENTARY TEXT

MOOD, A.M., F.A. GRAYBILL and D.C. BOES, Introduction to the Theory of Statistics, Third Edition, New York: McGraw-Hill, 1974. (MBG)

HANDOUT

Introduction to Probability and Statistics

EXAM BEFORE SUMMER COURSE: Time and location of the pretest is to be determined. Please contact the TA if you would like to take the pretest.

EXAM AFTER SUMMER COURSE: Saturday, August 10, 10:00am-12:00pm EST, in person.

ACADEMIC INTEGRITY

The student-administered University Honor Code and Honor Pledge (https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a) prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. On every examination, students must write by hand and sign the following pledge:
"I pledge on my honor that I have not given or received any unauthorized assistance on this examination or assignment."
Compliance with the code is administered by the Student Honor Council, which strives to promote a community of trust on the College Park campus.

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The lecture class and all other course materials that exist in a tangible medium, such as written or recorded lectures, Power Point presentations, handouts and tests, are copyright protected. Students may not copy or distribute such materials except for personal use and with the instructor's permission. Students may not download recorded lectures, but may only review them online.

STUDENTS WITH DISABILITIES

UMD guarantees appropriate accommodations for students with disabilities. If you require accommodations, please contact me as soon as possible. If you need further clarification, the link to DSS is:
http://faculty.umd.edu/teach/specialneeds.html

DISTRESS

Sometimes college students experience academic, personal, and/or emotional distress. The Counseling Center in Shoemaker Hall provides comprehensive support services that promote personal, social, and academic success of UMD students. The cost of these services is covered by fees you already paid when you registered, so there is no additional charge if you use these valuable resources. Proactively explore the range of services available including

the Counseling Service, the Disability Support Service, the Learning Assistance Service, and the Testing Office, all described at http://www.counseling.umd.edu/

COURSE OUTLINE AND TIME TABLE

(S) = suggested reading

1. Probability
   (5 lectures)
   (S) HMC: Ch. 1.1-1.3, CB: Ch. 1.1-1.2, MBG: Ch. I

2. Random variables, Distribution Functions and Expectations
   (5 lectures)
   (S) HMC: Ch. 1.5-1.10, CB: Ch. 1.4-1.6, MBG: Ch. II

3. Conditional Probability and Statistical Independence
   (4 lectures)
   (S) HMC: Ch. 1.4, 2, CB: Ch. 1.3, 4, MBG: Ch. IV

4. Special Distributions
   (2 lectures)
   (S) HMC: Ch. 3, CB: Ch. 3, MBG: Ch. III

5. Distributions of Functions of Random Variables
   (4 lectures)
   (S) HMC: Ch. 2.7, 2.8, 3.6, CB: Ch. 2, MBG: Ch. V

6. Point and Interval Estimation
   (4 lectures)
   (S) HMC: Ch. 4.1-4.4, 6, CB: Ch. 5-7, 9, MBG: Ch. VI-VIII

7. Hypothesis Testing
   (4 lectures)
   (S) HMC: Ch. 4.5-4.9, 6, 8, CB: Ch. 8, MBG: Ch. IX

8. Sufficiency
   (2 lectures)
   (S) HMC: Ch. 7.1-7.3, CB: 6, Ch. 8, MBG: Ch. VII

Note: 1 lecture = 1 ¼ hours

ADDITIONAL REFERENCES

The adopted textbooks are widely used for teaching probability and statistics in graduate economics programs. Just in case you are interested in some further readings, here are some additional references.

ASYMPTOTIC DISTRIBUTION THEORY

DAVIDSON, J., Stochastic Limit Theory, Oxford: Oxford University Press, 1994.

DHRYMES, P.J., Econometrics: Statistical Foundation and Application, New York: Springer Verlag, 1974.

PÖTSCHER, M.B., and I.R. PRUCHA, Basic Elements of Asymptotic Theory. In B. Baltagi (ed.), Companion in Theoretical Econometrics, Cambridge: Basil Blackwell, 2001.

SCHMIDT, P., Econometrics, New York: Marcel Dekker, 1976.

SERFLING, R.J., Approximation Theorems of Mathematical Statistics, New York: Wiley, 1980.

ADDITIONAL ADVANCED TEXTS

ANDERSON, T.W., An Introduction to Multivariate Statistical Analysis, New York: Wiley, 1958.

ATHREYA, K.B., and S.N. LAHIRI, Measure Theory and Probability Theory, New York: Springer 2010.

BIERENS, H.J., Robust Methods and Asymptotic Theory in Nonlinear Econometrics, Lecture Notes in Economics and Mathematical Systems, 192, New York: Springer Verlag, 1981.

BILLINGSLEY, P., Probability and Measure, Third Edition, New York: Wiley, 1995.

CHOW, S.Y., and H. TEICHER, Probability Theory, New York: Springer 2003.

CHUNG, K., A Course in Probability Theory, Second Edition, New York: Academic Press, 1974.

DHRYMES, P.J., Topics in Advanced Econometrics, Probability Foundations, New York: Springer Verlag, 1989.

FELLER, W., An Introduction to Probability Theory and its Application, Vol.I and II, New York: Wiley, 1968 and 1971.

GALLANT, A.R., An Introduction to Econometric Theory, Princeton: Princeton University Press, 1997.

LOEVE, M., Probability Theory, Vol. I and II, Fourth Edition, New York: Springer Verlag, 1977 and 1978.

RAO, C.R., Linear Statistical Inference and its Applications, Second Edition, New York: Wiley, 1973.

SHIRYAYEV, A.N., Probability, New York: Springer Verlag, 1984.

STOKEY, N.L., and R.E. LUCAS, Jr., Recursive Methods in Economic Dynamics, Cambridge: Harvard University Press, 1989. Chapter 7.

VAN DER VAART, A.E., and J.E. WELLNER, Weak Convergence and Empirical Processes, New York: Springer, 2000.

WHITE, H., Asymptotic Theory for Econometricians, New York: Academic Press, 1984.