Credit in ECE 313

- Credit: 3 hours or 3/4 unit
- ECE 313 is a required course in the BSEE and BSCompE curricula
- Credit in ECE 313 cannot be used to satisfy the requirements for the MS and PhD degrees in Electrical Engineering
- Graduate students in other Departments should consult their advisors regarding suitability and/or acceptability of graduate credit in ECE 313

What is ECE 313 all about?

- ECE 313 is a course on
  - The elements of probability theory
  - Applications of probability theory to the problem of decision-making under uncertainty, and to the problem of estimation of parameters
  - Applications to problems in communications, signal processing, computer networks, and reliability of systems

How is ECE 313 different?

- ECE 313 is different from many undergraduate courses (typically titled Probability and Statistics for Engineers or Statistics for Engineers) in that
  - ECE 313 is mostly about probability theory with only a few statistical applications included
  - The coverage of statistics is idiosyncratic and incomplete; primary topics are some problems arising in communication and radar systems
  - Emphasis is on understanding the probabilistic model and the reasons underlying the statistical tests, and not on learning how to apply lots of different tests

Why bother taking ECE 313 at all?

- You may need a refresher if it has been some time since you last studied this material
- As a undergraduate, you may have taken a course on statistics instead of one on probability
- The material in ECE 313 is fundamental knowledge that all electrical and computer engineers should know and be able to use
- ECE 313 is a prerequisite to senior-level and graduate courses in communications, computer engineering, control, and signal processing

Is there life after ECE 313?

- ECE 313 is a prerequisite for several senior-level/first-year graduate-level electives
  - ECE 387 — Image and Video Signal Processing
  - ECE 359 — Communications I
  - ECE 361 — Communications II
  - ECE 363 — Digital Communications Lab
  - ECE 371 RS — Wireless Communication Networks
  - ECE 371 GP — Fiber Optic Systems
  - ECE 371 GS — Optical Remote Sensing

Further life after ECE 313

- ECE 313 is a prerequisite for
  - ECE 413 — Digital Signal and Spectral Analysis
  - ECE 434 — Random Processes
  - ECE 441 — Computer Systems Analysis
  - ECE 447 — Image Processing
  - ECE 451 — Digital Signal Processing
  - ECE 453 — Optimum Control Systems
  - ECE 455 — Control of Stochastic Systems
  - ECE 459 — Topics in Communication Systems
  - ECE 461 — Detection and Estimation
  - ECE 463 — Information Theory
  - ECE 467 — Communication Network Analysis
  - ECE 484 — Reliability Engineering for Integrated Circuits
  - ECE 487WMS — Computer System Evaluation Techniques

Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign
### What background is needed?
- You are expected to have taken the usual math courses required of engineers (calculus and differential equations).
- Not required at all times, but occasionally very useful, is some familiarity with:
  - Elementary set theory (unions, intersections, DeMorgan’s Laws)
  - Boolean algebra, truth tables, Karnaugh maps, switching circuits
  - Elementary signal and system theory (Fourier and Laplace transforms, convolutions, transfer functions, etc.)
  - Notions of vectors and vector spaces, and matrix multiplication
- Typically the level of knowledge is what you would learn in the required courses for BSEE and BSCompE degrees.

### What time commitment is needed?
- Fortyone one-hour lectures
- Weekly homework assignments
- Two midsemester hour exams
- Three-hour final exam
- Expect to have to spend up to ten hours a week on:
  - Attending/viewing the lectures
  - Reading textbook, reviewing class notes, etc.
  - Working exercises and examples for practice
  - Doing the weekly homework

### Homework? In a graduate course?
- Each weekly homework assignment has lots of suggested non-credit problems — Try these before you attempt the assigned problems.
- Additional exercises can be found in the books by Ash and Hsu (see the Reserve Books list posted on the on-campus web page for details).
- Practice is the only way to learn this material.
- Read the FAQ for a homily on how to study for this course.

### What do I expect from you?
- Understanding what the mathematical calculations are saying instead of just relying blindly on answers obtained from formulas.
- Application of common sense (engineering sense?) to your calculations, and the gumption to re-do the work if the answers make no sense.
- Taking this course with a view to understanding the material, and appreciating the modeling problems that arise when applying this theory to engineering problems.

### Why should you take ECE 313?
- Because it is a lot of fun!