

Credit in ECE 313

- Credit: 3 hours or 3/4 unit
- ECE 313 is a required course in the BSEE and BSCoPE 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

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 1 of 11

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

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 2 of 11

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

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 3 of 11

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 an 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

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 4 of 11

Is there life after ECE 313?

- ECE 313 is a prerequisite for several senior-level/first-year graduate-level electives
 - ECE 318 — Image and Video Signal Processing
 - ECE 338 — Computer Communication Networks
 - 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

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 5 of 11

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 497WHS — Computer System Evaluation Techniques

ECE 313 - Introduction © 2000 Dilip V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 6 of 11

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

ECE 313 - Introduction © 2000 Dilly V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 7 of 11

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 upto 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

ECE 313 - Introduction © 2000 Dilly V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 8 of 11

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

ECE 313 - Introduction © 2000 Dilly V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 9 of 11

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

ECE 313 - Introduction © 2000 Dilly V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 10 of 11

Why should you take ECE 313?

Because it is a lot of fun!

ECE 313 - Introduction © 2000 Dilly V. Sarwate, University of Illinois at Urbana-Champaign, All Rights Reserved Slide 11 of 11