

ECE 440 – Spring 2019

Review Final

Non-exhaustive list of concepts covered

All the questions will be on the material from the lectures, no questions from the lab. The questions in the final exam will be approximately distributed as follows: 15% from the list below, 45% from the second midterm, 40% from the first midterm.

The exam will be closed book and closed notes, but TWO sheets of paper, handwritten on both sides will be allowed. The exam will still include a formula sheet with Fourier Transforms, trigonometric identities, etc. so don't bother including those in your cheat sheet. A simple scientific calculator is allowed but not needed. You are free to leave your answers in any form that can be directly computed with a calculator (e.g. $\sin(30)$ instead of 0.5). In the exam, you will be given partial credit for any progress in the right direction, even if you do not reach any final answer.

Make sure to review the homeworks.

At the end of each chapter in the book there is a summary with the main concepts covered. We have not covered all of them, but it is still a good idea for you to spend a few minutes reading them, skipping those related to topics not covered.

The following list of topics is indexed according to the 7th edition of the book. The same material should be in the 6th edition, but it could be in a different chapter. Per popular request, this list includes a list of the sections covered from each chapter. However, the book often describes topics in a lot more detail than covered in class. Other times, we have mentioned topics in class which are not in the book. Hence, I recommend using your own class notes as a guide, rather than studying all the indicated sections.

1 Chapter 1-9

See the lists for midterms 1 and 2.

2 Chapter 10 (10.4-10.5)

- Reasons to use spread spectrum modulation. Understand how each of them works.
- Understand Direct Sequence Spread Spectrum (DSSS)
- Using spread spectrum for multiple user access (CDMA)
- What causes the error floor of CDMA?
- Understand Orthogonal Frequency division multiplexing (OFDM). Advantages and disadvantages (no need to know equations)
- Relate number of subcarriers and their modulations to the overall bit rate
- Relate the bandwidth of each subcarrier with the duration of an OFDM symbol

3 Chapter 11

- Vector representation of signals (The list for Midterm 2 incorrectly listed the material about vector representation of signals as being in Chapter 10. A lot of it is in Chapter 11).

4 Chapter 12

- Definition of entropy.
- Discrete channel models.
- Joint and conditional entropy.
- Concept of channel capacity.
- What is source coding? What is channel coding?
- Rate of a channel code
- Minimum distance of a channel code
- Error correction and detection capability of a channel code
- Hamming bound on rate of a channel code with a given error correction capability
- Hamming channel code
- Bit interleaving to address error bursts