

INFORMATION ABOUT THE FINAL EXAM**Office Hours:**

Your GSI's will hold regular office hours throughout RRR Week and through Finals Week up through the Wednesday right before the Final Exam. There will be no office hours the day of the Final Exam. Prof. Nguyen will be traveling from Tuesday to Thursday of RRR week, so will not be holding regular office hours that week. But see below for additional office hours.

Additional Office Hours: (*in addition to regular office hours, of which there are plenty*)

Prof. Nguyen	3-4 p.m. on Monday, Dec. 9, in 574 Cory.
Prof. Nguyen	11-12 a.m. on Monday, Dec. 15, in 574 Cory.
Prof. Nguyen	11:30-12:30 p.m. on Wednesday, Dec. 18, in 574 Cory.
Kieran Peleaux	3-4 p.m. on Wednesday, Dec. 18, in 212 Cory.
Ali Ameri	2-3 p.m. on Wednesday, Dec. 18, in 212 Cory.

Review Session:

Friday, Dec. 13, 4-5:30 p.m., in 141 McCone.

Date of Exam:

Thursday, Dec. 19, 8-11 a.m. (sharp)

Place:

141 McCone (our regular lecture room)

General Information:

The exam will be closed book, but you can have three 8.5"×11" sheets on which you can write anything you would like on both sides of the paper. Bring a calculator to the exam. The exam will contain enough space to put all your work on its sheets. Show and include all your work on the exam sheets. The exam will consist of a few problems, each with a number of parts.

During the exam, make appropriate engineering decisions and approximations in order to simplify your analyses so that you can do the problems quickly and with fewer errors.

Material to be Covered:

The final exam is meant to cover all the material in this course, including the reading in Sedra & Smith, class lecture notes, handouts, labs, and homework. It might have a slight focus on more recent material. You might pay more attention to the following areas:

1. Frequency response calculation and determination. Be familiar with Bode plots (both gain and phase) and know how to determine the frequency response of circuits containing reactive components (e.g., capacitors).

2. Op-amp circuits. Know how to analyze various op-amp circuits that utilize feedback. Specifically, know the characteristics and operation of inverting and non-inverting amplifiers, and be prepared to analyze other (possibly unfamiliar) op-amp circuits. Make sure you understand the differences between open-loop and closed-loop op-amp circuit performance.
3. Ideal and non-ideal op-amp operation and characteristics. Know the various op-amp non-idealities and be prepared to predict how they influence circuit performance. Understand their effect on feedback amplifier performance.
4. Semiconductor physical concepts and device operation for pn-junction diodes and transistors, particularly MOS. Be able to determine regions of operation and the DC operating points for transistors in specified bias configurations. Also, be prepared to handle op amp circuits using transistors in their feedback loops, such as in Lab#3.
5. Interpretation of devices as nonlinear elements and methods for modeling physical devices using nonlinear models.
6. The concept of large and small signals and the need for small signal analysis. Large and small signal models for bipolar and MOS transistors and determination of small signal elements/parameters.
7. Biasing of BJT and MOS amplifiers: parameter independent biasing.
8. Frequency response calculations using open- and short-circuit time constants.
9. Analysis of single-transistor amplifiers, including common-emitter, common-base, and common-collector topologies. Be familiar with transistor large-signal and small-signal models, biasing, midband parameter determination, and frequency response determination. Know inspection analysis techniques.
10. Analysis of multi-stage amplifiers, particularly biasing, midband parameter determination, and frequency response determination of such amplifiers. The topologies to be given could include those covered in lecture and in the text, or circuits you've never seen before. Be prepared to see an unconventional circuit and remember that you have all the fundamental skills required to analyze it. Transistor current sources also may appear on this exam.
11. Design of single- and multi-stage amplifiers. This could be open-ended or you could be asked to modify an existing design to meet given specifications. For this, you must be familiar with characteristics of the single-transistor amplifiers and combinations of them (i.e., which combinations give high bandwidth with high midband gain?).
12. Fundamentals of digital circuits, including voltage transfer characteristics (VTC) and propagation delay. You should know how to determine important VTC points, and you should be able to determine the propagation delay of a CMOS inverter, or a simple CMOS logic gate.