

Administrivia

- Final Lecture!!!!!!
- HW solutions, midterm solutions and practice problems solutions will be up after lecture today - I won't be in my office today afternoon!
- A correction in Jonathan's discussion - CHECK THE NEWSGROUP.
- For regrades on MT 2 - Go to JONATHAN's office hours.
- RETURN CALBOTS BY THURSDAY, 08/14/03 OR ELSE....

Last time...

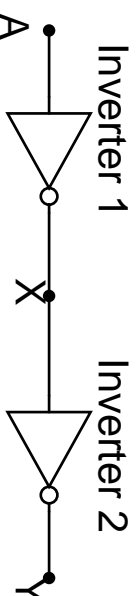
- CMOS layout
 - PRACTICE IN SIMPLer!!!!!!!!!!!!

This time...

- A mega example: We will analyze the CMOS inverter pull-up and pull-down transition. But, we will extract the Rs and Cs from the layout.
 - Extract R_p , R_n
 - Extract C_{GS} , C_{DB}
 - Understand interconnect resistance and capacitance
 - Extract $R_{interconnect}$ and $C_{interconnect}$
 - REFERENCES: Lecture 19 (FALL 1999) , page 6, 7, 8, 10, 11.
 - Lecture 23 (FALL 1999) page 10, 13 - 19.
- Where do you go from here?
- Course survey(s)

Problem Statement

- Compute τ_{pHL} and τ_{pLH} for inverter 1 in the cascaded CMOS inverter configuration below. Extract the R_s and the C_s from the layout. Do not ignore interconnect resistance and capacitance. You can assume the inputs at A make instantaneous transitions.



Inverter parameters

Transistor Parameters

$$V_{DD} = 5 \text{ V}$$

$$V_{Tn} = 1 \text{ V}$$

$$V_{\text{threshold}} = 0.5 V_{DD}$$

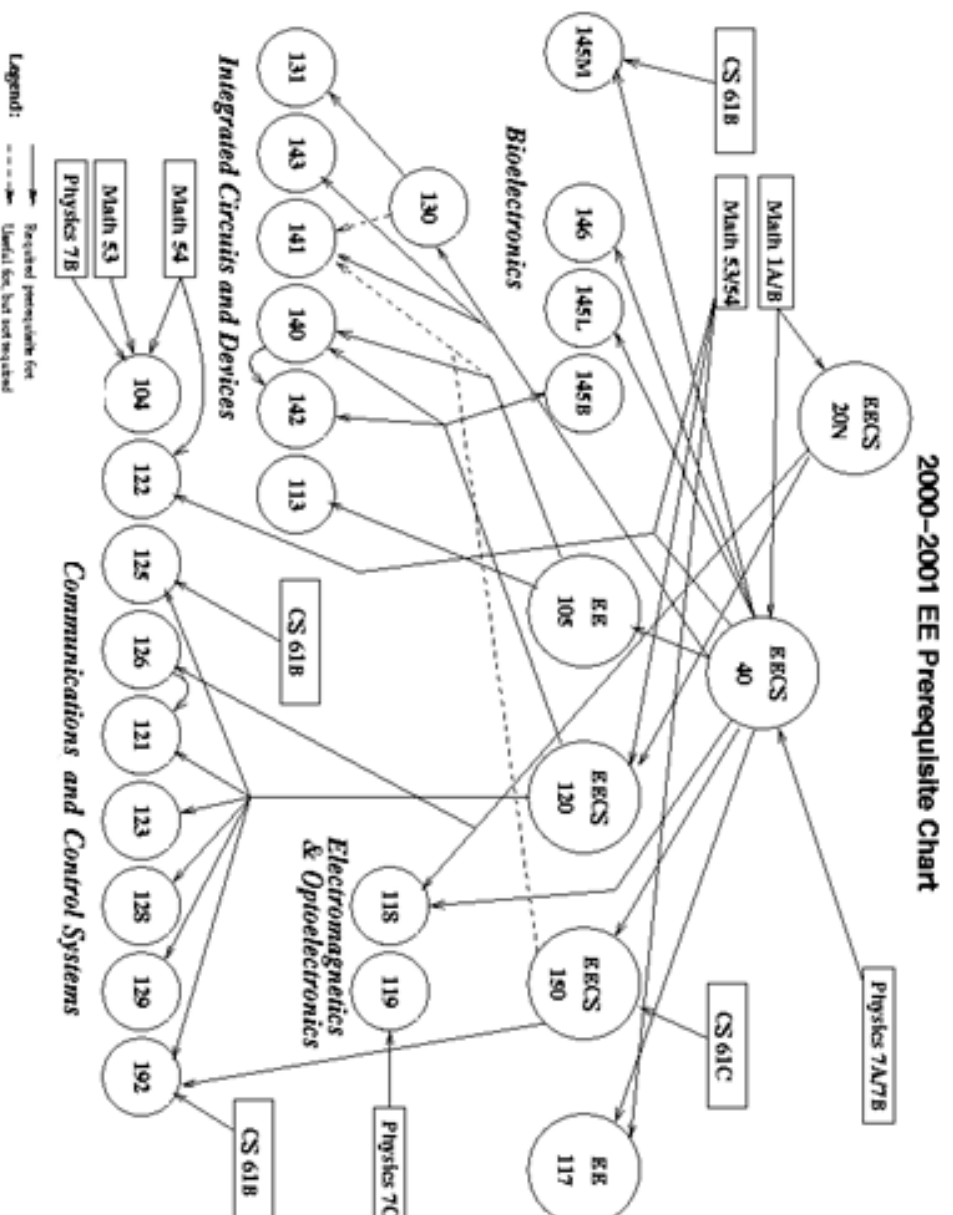
$$K = 20 \text{ mA/V}^2$$

$$\text{Lambda} = 0 \text{ V}^{-1}$$

Before we look at the classes...

- Assumptions:
 - Start at your junior level
 - Assume you have core courses already: CS61ABC, EECS 20 and EECS 40.
 - You are in EECS and you are interested in EE.
- Watch out for:
 - Classes that are available **ONLY** IN SPRING (eg: EECS 192). The moral: Proper planning for taking courses is necessary.
 - Really hard instructors. The moral: TALK to students.
 - E190. Highly impacted. The moral: Organize your schedule around this class at least a year before you graduate.
 - Too many techie courses in one semester, ≥ 4 courses is SUICIDE.
 - Too many project courses in one semester, only one per semester.

Where do you go from here?



Courses I would take if I were you...

- Junior Year Fall: EE105, EE120, Humanities
- Junior Year Spring: EE140, EE117, Humanities
- Senior Year Fall: EE128, EE141, EE126 (Tough Semester)
- Senior Year Spring: EE192, EE190 (hey, probably last semester, take it easy!)

Very short course descriptions

- Mathematics behind EE:
 - EECS 120 - **Signals and Systems** - Basic systems theory, control theory and signal processing. Prerequisites: EECS 20.
 - EECS 121 - “**Intro**” to **Digital Communication Systems** - VERY, VERY DIFFICULT (but INTERESTING) class, talks about probability and random processes in digital communication systems. Prerequisites: EECS 126 + mathematical maturity.
 - EECS 122 - **Introduction to Communication Networks** - Talks about different protocols like TCP/IP etc. Prerequisites: Common Sense.
 - EECS 123 - **Digital Signal Processing** - Talks exclusively about fourier transforms as applied to discrete signals. Prerequisites: EECS 120.
 - EECS 125 - “**Intro.**” to **Robotics** - Talks about mathematical modelling of robot arms. Not as intense as EECS 121, but still mathematically demanding. YOU DO NOT BUILD ROBOTS IN CLASS - YOU JUST USE MATLAB! Prerequisites: Common

Sense.

- EECS 126 - **Probability and Random Processes** - Getting you prepared for analyzing noise in EE circuits. Mathematically intense. Prerequisites: Common Sense + mathematical maturity.
- EECS 128 - **Feedback Control** - A VERY USEFUL/PRACTICAL CLASS. Talks about control systems - for more info. take this class! Prerequisites: EECS 120.
- EECS 129 - **Nonlinear Circuits** - Interesting class. Talks about neural networks. Prerequisites: Common Sense.
- EECS 192 - **Mechatronics Design Lab** - AWESOME CLASS. You get to actually build an autonomous race car (a robot). Prerequisites: CS61C, EECS 120, Common Sense.

Conclusion

- THANKS FOR BEING A GREAT CLASS!!!!!!!
- Course surveys: HKN and mine.
- GOOD LUCK!

Next time...

- I will be here from 12:00 - 2:00 pm, just a question and answer session.
- PRACTICE PROBLEMS SHOULD HELP YOU PREPARE FOR THE FINAL.