

VLSI Workshop Day 3

• Today's Topic: Effective Teaching

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
9:00	<i>common session</i>	<i>common session</i>	<i>common session</i>	<i>common session</i>	<i>common session</i>
9:30	Introduction; VLSI Curriculum; Course Content Overview	Course content: technology & device models	Teaching skills; effective lectures	DIS: Research in Education	DIS: Engaging in Research
10:00				New tech. resources	Research: MEMS & Sensors
10:30					
11:00	Components of VLSI Course	Course content: CMOS logic, layout, sequential logic	Teaching resources; effective homework, exams, labs	Trends in VLSI	Research: Bio-medical Electronics
11:30				VLSI Implementations of DSP	
12:00					
12:30	<i>lunch</i>	<i>lunch</i>	<i>lunch</i>	<i>lunch</i>	<i>lunch</i>
1:00					
1:30	<i>common session</i>	<i>common session</i>	<i>common session</i>	BOG: VLSI Course Content Lectures	<i>common session</i>
2:00					BOG: New Technology Lectures
2:30	Components of VLSI Course	Advanced/grad topics & courses	BOG: Session A		
3:00		DIS: What BOGs do you want?	DIS: Challenges to Teaching VLSI	BOG: Session B	DIS: BOG
3:30	DIS: Break Out Groups & Lectures		<i>common session</i>		
4:00					DIS: Summary & Action Items
4:30					
5:00					
	<u>Questionnaire</u>	<u>Course Lecture</u>	<u>Course Lecture</u>	<u>New Tech Lecture</u>	

Day 3 Agenda

Morning

- Reminder: Prepare lectures for tomorrow
- Questions from Day 2?
- Presentation skills
- Effective lectures
- Effective homework, exams, and labs

Afternoon

- Break-out Group: Session A
- Break-out Group: Session B
- Industry perspective (Dr. M.P. Ravindra, Infosys)

Overnight Assignment

- Prepare lecture presentation: topic selected yesterday

Presentation Skills

Effective class lectures require presentation skills that can be *learned*

- Outline
 - Video on “How to Speak”
 - Discuss video
 - My own lecturing tips
 - Practice in break-out groups tomorrow
- Make our own list of lecturing tips
 - Before watching video
 - After watching video
 - Record list to post on workshop website

Our Lecture Tips (Before Video)

Describe some of your lecturing tips

- set objective(s) for each lecture with relevance to students
- plan and practice
- motivate student
 - interactive with students –get to know your students
 - ask questions/summary
 - case studies, demonstration
 - props, teaching aids
- review past lectures, repeat important ideas
- provide reference/resource material
- introduce upcoming lectures/topics

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Video: How to Speak

- Professor Patrick Winston, Massachusetts Institute of Technology, “How to Speak” (1997)
 - Derek Bok Center for Teaching and Learning (Harvard)
 - <http://sites.harvard.edu/fs/html/icb.topic58703/winston1.html>
- Take notes on key points you consider useful & those you disagree with
- Watch videos

Our Lecture Tips (After Video)

Describe video points you agree (or disagree) with

- ok to be eccentric
- salute audience
- eye contact, read audience reactions
- humorous stories
- hand gestures and body language
- blackboard use/management
- .

What other element could you use in your “Big 4”?

- hand gestures and body language
- .

Video: Some Take-Home Points I Noticed

- Questions should be answerable
- Wait for answer to questions (5 second rule)
- Pace set by using blackboard vs. using slides
- Speaker used real world examples (“stories”) to support most of his points
 - e.g., cannon ball, skier, instructor’s tie
- Pose a question to get questions started
- Use of known techniques can add confidence to speaker
- Relate lecture to things audience already knows

“How To Speak” Outline

- How to Start
 - (don't Joke)
 - Promise
 - Menu
- The Big Four
 - Cycle (repeat)
 - Verbal punctuation
 - Near miss
 - Ask question
- Time & Place
 - 10 or 11am
 - Well lit
 - Full
- The Blackboard
 - Draw
 - List
 - Target
- Overheads
- Props
- Style
 - (don't Copy)
 - Adapt
 - Eccentric
 - Story
- How to End
 - (don't Thank)
 - Joke
 - Deliver (remind of promise)
 - Ask for Questions
 - Salute
- Questions
 - Ask a question
 - Non-verbal communication
 - Conversation vs. lecture
 - Use of slides
 - Being nervous

My Lecturing Tips I

- Attitude
 - you must *show* you are interested in the material
- Delivery
 - Tone
 - don't be monotone; alter pace and inflection
 - Engagement
 - critical for effective lectures to students; keep students involved
 - ask answerable questions; wait for answers
 - use stories and examples to alter pace
 - have students come to blackboard to solve example problems
 - do not overly complicate issues; teach what they need to know
 - Repeat important concepts; in different ways if possible
 - Examples & Story
 - create examples to demonstrate how principles can be applied or equations can be used
 - develop stories (real live analogy) to relate some concepts each lecture
 - example: describe diffusion

My Lecturing Tips II

- Aids

- Slides

- teaching VLSI requires complex diagrams and schematics
 - slides very helpful
 - if all lecture material on slides, provide slides to class
 - if providing slides, add details beyond bullets so students can study from slides
 - consider leaving some information off handout slides so students can fill in the blanks as you speak
 - works especially well for examples
 - slides provide a lot of information quickly; take care not to go too fast

- Props

- materials and tools of the trade will be new to students
 - creates interest and feeling of value in real life
 - examples
 - silicon wafers, photomasks, chips under microscope, chip layout plots
 - industry contacts useful to supply good props

My Lecturing Tips III

- Answering questions
 - be concise; encourage more participation in limited time
 - don't be afraid to say 'I don't know'
 - try to come back the next day with answer
 - encourage student to find answer and report back; builds confidence
 - avoid asking students if they can answer another student's question
- Managing time
 - cover only the material you can cover thoroughly
 - poorly explained concepts will not stick with students beyond class
 - allow time for and encourage questions
 - but do not let questions delay your schedule; answer concisely
 - postpone complex answers until after class –but do answer them
 - never complain about being behind; it's your job not theirs

Tips on Homework

- ensure assignment length matches expected time out of class
 - account for lab also
- focus on important concepts
 - do not create “busy work”
 - reinforce the importance of homework concepts in class
 - helps students feel their time on homework is valuable
- start with 1-2 easy to solve problems
 - find right equation; insert parameters; calculate
 - helps students build confidence before tackling harder problems
 - break problems into easy to understand steps; walk them through the problem
- advance toward more complex problems
 - integrate multiple concepts into one problem
 - add ‘given’ parameters that are not needed to solve problem
- homework is good for developing a feeling for expected magnitude of parameters
 - ensure your problems/answers have proper magnitudes
- unit conversion/matching often challenge students
 - require proper units for answers
 - teach how to do unit conversions (e.g., $\text{cm}^3 \rightarrow \text{um}^3$) and know metric units

Tips on Exams

- much of VLSI Design is concepts rather than problems
- my exam format
 - 50% split of concept questions (T/F, multiple choice)
 - 50% calculation problems
 - based on homework, but not copied from
 - example exam posted on workshop website
- simplify grading
 - T/F & multiple choice easy to grade
 - but not effective for entire exam
 - do not allow mistakes to carry forward
 - break problems into steps
 - provide new parameter values: “assuming that $Y = 3$ in part (a)...”
 - provide lines/boxes for answers & require specific units
- minimizing cheating
 - different exams; or print in different colors to appear different
 - honor pledge
 - monitor exam
- editing: thoroughly proofread exam to eliminate mistakes
 - gives impression you have not put as much effort in as students have studying

From a previous workshop (P.R. Kumar)

Do you still have questions on any of these issues?

- how to establish an open environment where students can ask questions
- how to break the ice in the classroom so that there is participation by the class
- how to answer questions
- how to be concise yet to the point
- how to make powerpoint slides
- how to let the audience know what part of the slide you are talking about
- how to explain "difficult" material
- how to use the laser pointer
- how to use figures

Learning Resources

- My website for writing and presenting
 - <http://www.egr.msu.edu/~mason/writing.htm>
 - tips from me and links to many others, including IUCEE presenters
- Others that you know of?
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- Interest in forming a teleconferencing meeting group for workshop participants?

Workshop Assessment

- Importance of assessment in your class
- Are you enjoying and learning from the workshop?
- If not, why?
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- What would you like to see added to or removed from the workshop schedule?
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Day 3 Afternoon Break Out Groups

- Break into groups based on topic interest
 - Session A (pick one)
 - Preparing homework
 - Developing final year projects
 - Establishing relations with industry
 - Getting chips fabricated/tested
 - Session B (pick one)
 - Setting up VLSI lab assignments
 - Developing PG projects
 - Engaging in research
 - Evolving/expanding curriculum
- Form break-out groups now
- Questions?

Example BOG: Homework Problems

- Discuss challenges to incorporating homework in your course
- Prepare a homework problem: 20-30 min
 - include figures, schematics, etc.
- Present your problem to your BOG: 5 min each
- Receive positive feedback and criticism: 5 min each

Industry Perspective

How can Indian instructors engage with industry?

- How to seek potential student employers to discuss curriculum and course content from industry perspective?
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- How to seek faculty/industry exchange opportunities?
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- How to establish relationships leading to research?
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- Others?
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Day 3 Wrap-Up

- Reminder: brief lecture presentations tomorrow
 - Overnight assignment: prepare presentations; consider what you have learned today
- My homework; make sure we have rooms for BOGs tomorrow afternoon