University of Illinois Ch&Biom Eng Commencement Address

CONGRATULATIONS!!

Altho it's been 67 years I remember the pride, elation & relief of this day -- & my Mom & Dad were there to share.

Your getting one of the toughest degrees from a top-rated school lays the foundation for a great career – possibilities are unrestrained. But your days of study are not over. Your success will be paced by learning – facts & knowhow – that you haven't even thought of. Fortunately, most of the world's knowledge is at your fingertips -- & you will add to that.

You have arrived at a key juncture. For 16 - 20 years effort has been prescribed. That's over. You are no longer a driverless car. A Yogi Berra pearl is, "If you come to a fork in the road, take it." That's passive. You will define your destiny. You have already begun to chart your path -- putting in the forks you will strive to reach. The plan's far horizon is financial independence so at the end you can enjoy the fruits of your life's work.

KEYS TO SUCCESS!

My most memorable event here came in a math class taught by Tom Baron, a brilliant, flamboyant Hungarian immigrant The content was differential equations explaining physical & chemical processes.

Exciting -- math was ever my favorite subject – caused me to go to work in Dow Chemical's new Computer Lab where I wrote my 1st program in 1955. Computer applications have been the centerpiece of my career. Currently I spend about half of each weekday at my PC – day trading online, software development, composing, exercising my brain with Sudoku.

In Baron's class was Szabo, who asked inane questions. In a biology class studying the root system of grasses he might ask, "Why is grass green?"

Nearing lecture end with 3 blackboards full of equations & Baron readying for the opus finale, Szabo asked his question. Baron spun shooting his finger at Szabo, "Vas ist your nom?" "Szabo" "Vas ist my nom?" "Dr Baron" "Why ist your nom not my nom. That's the kind of question you ask!!" Szabo asked no more questions.

Moral.

Do not be a Szabo. Look at the person beside you. If that were Szabo, would you want him to be a key man on your project? JUDGMENT! Every day of your professional life a jury of your peers and superiors is judging you. Their verdict will shape your progress.

JUDGMENT!

Those Russians running a nuclear reactor shutdown test at Chernobyl, were engineers, just like you. The area contaminated will be uninhabitable for hundreds of years.

RISK!

As you begin to make decisions, remember the computer adage, "Garbage in, garbage out". Before you act, remember your physics, chemistry, engineering – does it compute. If it doesn't, reboot!

You only succeed if you get things done, BUT you must consider the RISK.

I cannot fathom why on April 20 2010 the BP boss on the Deepwater Horizon ordered the mud in the Macondo well to be circulated out with less-dense sea water. The weight of that 18000 ft of heavy slurry exceeded the pressure in the oil. A simple mental calculation tells you that when the hydrostatic pressure in the sea water at the well's bottom fell below that of the oil's dissolved gas – methane – it burst out up the pipe and exploded at the surface. Eleven men at the wellhead disappeared, the ship burned and sank, 50 billion dollars was spent cleaning the oil leaked into the Gulf of Mexico.

COMMUNICATION SKILLS!

These will be key to your success. You know that "I'll scratch your back, you scratch mine" lubricates the gears of progress. PRACTICE SPEAKING! Hone your delivery, speak clearly, express ideas simply and concisely -- showy words turn folks off. Correct grammar stamps intelligence. LEARN TO WRITE. The common complaint about the engineers we turned out at Southern Cal: "They can't write." Go to work with WORD & Power Point and shape your message. Keep a dictionary online to confirm your word choices.

THE BOTTOM LINE!

No matter where you go – Industry, Research, Charity, Government, Academia – Two questions will override all. "Where do we get the money?" and "How do we spend it?" Budgets! Budgets! Paul tells me of his dilemma – wheedling money to hire TAs to help teach you. {*Paul, if you paid them what I got in 1950, that would reduce the need by a factor of 10 --- but they would be starving in a month.*)

Every significant expenditure will be tested beforehand for payout time and rate of return. Rate of return falls directly out of DCF -- discounted cash flow. If you use the right equations, getting what you need under your belt is not too tough. On my company's web page is a treatise that evolved out of my teaching engineering economics for 20+ years that I think explains this clearly. Let me know if you want the reference.

Risk is a vital consideration because project costs exceeding estimates is almost guaranteed. We all seem to be wishfully optimistic. Costs have doubled on the nuclear plants a building in GA & SC -- billions of dollars, cost to generate a KW over 6 times that of a gas fired generator – that can be built in a year. Westinghouse bankrupt, very likely those plants will never be finished. Déjà vu Hanford Washington 35 years ago – all over again.

Speaking of energy, take your hat off to George Mitchell, Valedictorian, 1940, Texas A&M. Mitchell proved the fracking procedure that has doubled US oil rate, cut oil price in half, given us burgeoning supplies of natural gas that will feed the chemical plants that you will help build. You don't need a son or daughter with boots on the ground to know that energy Independence is a major boon to our welfare.

INTEGRITY!

Your integrity is your badge of dependability and trust.
If you remember nothing else I say today, remember this.
If your boss asks you a question and you do not know the answer, Do Not, I Repeat Do Not babble gibberish.
Say "I don't know. But I'll find out. When do you need the answer?"

In 2084 some of you may come back here on a day in late spring. Some buildings will be staunchly standing, things will be different but the aura will still be here.
And you will feel the nostalgic pleasure and glow that I feel being with you today.
And you will reminisce on Paul and Dick and Ed and others.
As I am today – Jim Westwater, Masters – Harry Drickamer, PhD, Tom Hanratty, Dept basketball team, John Bardeen – before he got his 1st Nobel with Shockley and Brattain, well deserved since the transistor revolutionized the World.
I humbly thank Paul for inviting me to keynote your launch.
And now the bottom line. Your intense tech training focused on exactitude – heat transfer, chemical reaction, atomic orbitals, laminar and turbulent flow, etc. And I have focused on do's and don't's. But the potential for remarkable success requires you to break out of these bounds. Knowing "What is.", creativity asks "What might be?" Your lifetime challenge is to free your God-given, demonstrated mental capability to "think outside the box."
So go out and make your mentors proud of the results of this slice of their life's work.

THANK YOU