

## **Graduate Student Welcome (9/5/90)**

### **Welcome to Michigan!!!**

It is always a pleasure to have the opportunity to welcome new graduate students to the University...since, way back when I had an honest job as a faculty member, it was in a small department that primarily focused on graduate education.

Indeed, my most valuable colleagues and closest friends were always my PhD students... which is natural, I suppose, because the bonds between faculty and graduate students are particularly strong in almost every discipline.

We worked together...played together...and learned together...

### **The Excitement of Graduate Study**

Many of you are making that proud transition from undergraduate to graduate student...

Thinking back, almost 25 years ago when I made the same transition, I can recall many of my reactions at the time...

1. The very rapid sense of responsibility and control. Graduate students are expected to possess the intellectual maturity to determine their own course of study -- to set their own pace...
2. The intellectual excitement--of being able to dig into a subject as deeply as you choose!
3. The quality of student colleagues...I made the transition from Yale to Caltech. When I left Yale, I felt that I was at the top...only to find at Caltech that students from renown institutions like Southern University of North Dakota at Hoople were capable of blowing my socks off -- as were the Caltech freshmen in some of my classes. It was a humbling, though important, experience...
4. The sense of collegiality with the faculty.  
In a short time, many of you will have acquired knowledge in a narrow area that exceeds your faculty advisor. At this stage, the learning

relationship passes from a parent/child to a peer-to-peer nature...and you become a collaborator and a colleague.

(Although I would note that this biological relationship model seems to apply in tracking the family tree among PhDs...

For example, I can trace my own PhD heritage back to Von Karman...

while I can also count some 22 PhD children ...and perhaps another 50 PhD grandchildren...

5. Actually, graduate study is one of the most exciting periods in your intellectual development since you will rapidly become a master in your chosen area of study... and indeed can draw on the reputation of the institution and your faculty colleagues...yet you are not subject to the other pressures of a faculty position -- e.g., pressure to achieve tenure.

**Hence, as you take those first steps down the**

exciting trail of a college education, perhaps it is appropriate for the President of the University to pass along a few pearls of wisdom...

Actually, I would never dare give you any words of advice from my perspective as the University's supreme bureaucrat.

But, as a faculty member, I have spent almosts 20 years teaching and advising graduate students...  
...so let me comment from that perspective

**1. Michigan is not a small liberal arts college...it is a great research university.**

It is also a very large, complex, and exciting place.

Some parameters of the University

Parameters:

Enrollment: 35,000 (Ann Arbor) (47,000 total)

Faculty: 2,600 (14,000 employees)

Budget: \$1.5 billion

Academic Units

17 Schools and Colleges

Hundreds of research centers, institutes, and other types of interdisciplinary

programs

We also run the largest health care system in the Midwest, treating over 750,000 patients each year...

We conduct events in the performing arts which rival New York and London...

whether it be Leonard Bernstein performing his 70th birthday concert with the Vienna Philharmonic or, God-forbid, the Grateful Dead....

And, speaking of entertainment, we also have the Mo and Steve show...the Michigan Wolverines... playing in the fall to 105,000 every Saturday afternoon

Or, in the winter and spring, to every household in America...  
...at least if we make the Final Four....

Mission:

- i) Provides instruction, research, service
- ii) Spans all intellectual disciplines and professional areas
- iii) Attempts to conduct programs that rank among the nation's best in all areas (and succeeds...)

On this campus, we provide one of the most incredible intellectual smorgasbords in the world--a fascinating cornucopia of ideas supported by some of the finest facilities in the world -- one of the nation's great libraries, museums, laboratories, computers, concert halls, athletic facilities -- and even more important, one of the world's great faculties.

## **2. The Extraordinary Breadth of the University**

This rich variety is demonstrated by the events of a single week this summer in which:

- i) A team of Michigan medical scientists announced they had discovered the gene responsible for neurofibromatosis...Elephant's Man disease ...incidentally the same team discovered and cloned the gene responsible for cystic fibrosis last fall.

- ii) A team of Michigan students won the solar car race from Florida to Michigan, thereby earning the right to represent the United States in the world competition in Australia this fall.
  - iii) It was announced that two Michigan faculty members had won MacCarther prizes prizes, the key prize used to acknow
  - iv) The major computer network, operated by the University in collaboration with IBM and MCI, passed the milestone of linking together over one million users in the U.S. and around the world...
  - v) Michigan scientists achieved the world's most powerful laser--with power equivalent to 40 times the electrical generating capacity of the U.S.
  - vi) Teams of Michigan business students spent the summer in Poland, Soviet Armenia, and Czechslovakia helping these rapidly changing nations in their transition to capitalism.
  - vi) A Michigan paleontologist discovered a fossil demonstrating that whales once had hind legs and feet!
  - vii) And while not much happens in athletics during the summer, one of our women engineering students won the American Gladiator competition... and one of our alumni--and a former Regent-- Bob Nederlander, succeeded George Steinbrenner as managing owner of the New York Yankees.
- Not a bad week! But then, it was rather typical for this remarkable university.

### **3. Importance of diversity to this campus**

UM has made a very deep commitment to the achievement of an environment which seeks, nourishes, and sustains racial, cultural, and ethnic diversity.

We believe it essential to develop an environment of mutual understanding and sensitivity on this campus that not only tolerates diversity, but moreover seeks and embraces it as one of our most cherished characteristics.

There seems little doubt that America of the 21st century will probably be the most pluralistic,

multicultural nation on earth...and perhaps in the history of civilization...

It will be a nation of peoples of vastly different backgrounds, cultures, and beliefs...peoples seeking to retain their cultural roots...to maintain their identities

On this campus many of you will encounter for the first time in your lives the remarkable diversity and richness of peoples of different races, cultures, religions, nationalities, and beliefs.

One of the most important things our students must learn on this campus is to respect others for their differences...as well as their similarities...

To learn how to resist the great pressures of separatism, fear, and bigotry which push us apart...  
...and instead commit themselves to a university...  
...indeed, to a nation, committed to working together, united by a common set of beliefs and visions.

Michigan is first and foremost a "UNI" versity.

Hence view our challenge...and the challenge before your sons and daughters...as learning how to weave together these dual objectives of diversity and unity in a way that strengthens our fundamental goal of academic excellence and serves our society.

In a very real sense, we believe that Michigan has a mandate to serve as both a microcosm and leader of society at large..

We believe in and we are committed to a diversity in our people, in our activities, in our intellectual endeavors, which mirrors the great diversity of our nation and the world...

But we also believe that our university has a special responsibility to develop effective models of multicultural communities, in which peoples from vastly different backgrounds study together and learn together.

We believe that this commitment to diversity and unity is key to the quality and distinction of this University--and to the quality of the education your sons and daughters will receive.

For that reason, it is absolutely paramount that our students, just as our faculty and staff, demonstrate the sensitivity and tolerance toward others of differing races, cultures, and nationalities... and seek to learn from this remarkable diversity of people and ideas on this campus.

This will be an essential component of their education.

#### **4. The role of graduate students**

Graduate students play many roles in a research university:

- students
- teaching assistants
- research assistants
- faculty colleagues

You will soon be confronted with several of the age-old tensions which surround university faculty...

Perhaps the most important of these is the perceived tension between scholarship and teaching...

I suspect that all of you have confronted at times the competing demands posed by your teaching assignments and your thesis research.

Of course, as faculty members, you will also experience the same challenge between scholarship and teaching throughout your academic career.

All too often we are inclined to point at this tension between teaching and research as something unhealthy... as something detrimental to the quality of education...

However, let me suggest that it is instead, the very cornerstone of what makes education at a research university so very important...

For unlike small liberal arts colleges, a major research university like Michigan expects all of its faculty to be active scholars...and to bring that perspective formed from the continual struggle to extend mankind's knowledge into the classroom.

Indeed, I believe that the unique character of the education at this institution is due to the manner in which we strive to bring together talented undergraduates with active scholars...thereby exposing them to the excitement,

challenge, and occasionally, the frustration of scholarly inquiry.

This is what makes Michigan...and Berkeley, and Stanford, and Harvard...such important institutions in our society...

And this is what makes your role as developing scholar-teachers so important.

**5. Finally, let me suggest something else that**

may sound almost sacreligious in the tradition-bound world of graduate studies.

You are preparing to enter one of the most fascinating experiences of your lives...

This will be one of the few occasions in your life when you are relatively unconstrained--at least in an intellectual sense--try to inject a sense of daring and adventure in your work...

Try to be creative and imaginative...

I don't know how many of you have ever read Thomas Kuhn's book on the nature of scientific revolution, but Kuhn points out that most scholarship is really quite traditional... it is really not designed to produce major novelties.

Progress is not gradual, but rather occurs through revolution... through dramatic changes from one way of thinking... from the old "paradigm" as Kuhn puts it, to the new "paradigm"

As Kuhn puts it, those scholars who achieve the fundamental inventions of a new paradigm have been either very young or very new to the field whose paradigm they change. These are the individuals who, being little committed by prior practice to the traditional rules of normal scholarship, are particularly likely to see that those rules no longer define a playable game and to conceive another set that can replace them.

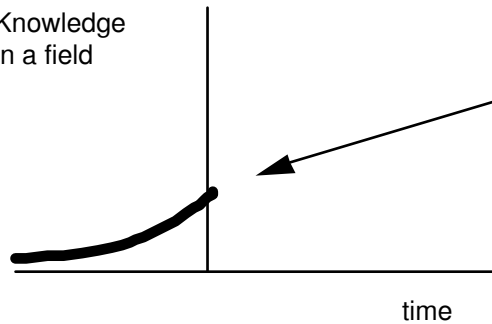
In a sense, try something new before you fall into the same ruts that have trapped the rest of us.

**7. Working on the Exponential Part of the Knowledge Curve**

There is yet one other theme that I want to suggest  
This term comes from a simple model of the growth of knowledge in a field over time as the familiar S-shaped curve.

In the early stages, the growth of knowledge is exponential with time, since the more you learn, the more rapidly the rate of knowledge

increases...  
Knowledge  
in a field



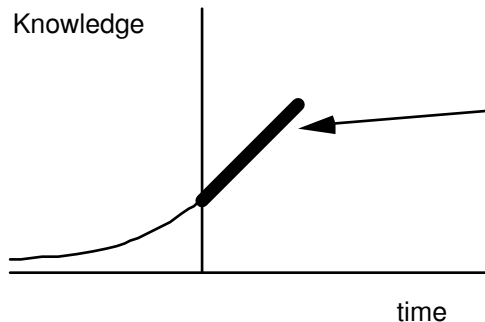
Exponential growth  
of knowledge...  
a few people with  
extraordinary intellectual  
span...

At this early stage, a few individuals of exceptional ability and great intellectual span can have truly extraordinary impact, essentially stimulating and defining entirely new fields of knowledge...

This is the "high risk" area...since it can frequently take years (in addition to great talent) to achieve something...

As a field matures, the growth in knowledge becomes linear with time....

Knowledge



Linear growth...  
Safe scholarship...  
Lots of people and  
lots of dollars...

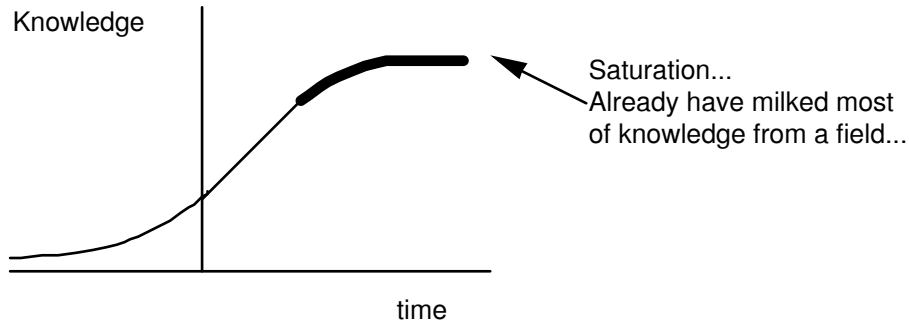
In this stage, the more resources you throw at an area...the more people or dollars...the more you learn...

(I usually refer to this as the Michigan region of the knowledge curve...you might prefer to call it the MIT region instead...)

This is where it is "safest" to work... easiest to get grants and to achieve tenure...

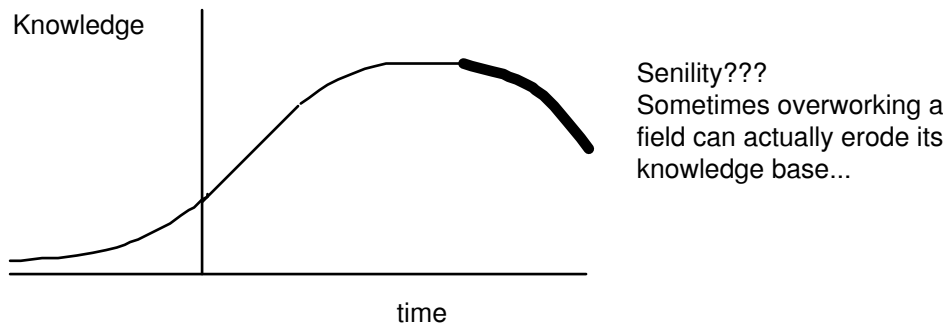
As the field matures still further, the growth in knowledge tails off...it saturates...a law of diminishing returns sets in as one mines most of the new knowledge out of a field.





All too often, many of us get trapped in this regime...essentially trapped in a rut.

Some of my colleagues suggest there may be a fourth phase...they refer to it as senility... where continuing to work in a field actually is counterproductive and reduces its knowledge content.



(Actually, there have been times recently when I've begun to wonder if my old field, nuclear fusion, has entered this final phase of intellectual evolution of late...)

All too often people...and institutions... tend to regard their role more as the keepers and transmitters of existing knowledge than as the creators of new knowledge...and chose to work only on the safe problems.

But you, as graduate students, not only have the talent... but also the education to work down in the high-risk, exponential part of the knowledge curve...

## 8. Fun

Oh, and one more thing...Try to have some fun in your graduate studies...it can be one of the most enjoyable intellectual experiences of your lives.

Light up a bit...ENJOY!!!

**Michigan is an exciting, challenging...sometimes frustrating...but always rewarding place.**

Let me wish you the best as you start the fascinating  
and rewarding experience of graduate study at Michigan.  
Once again, congratulations on your accomplishments...  
and we wish you the best as you pursue your careers as  
future members of the academy.