

# “Student Success in Community College Chemistry Courses”

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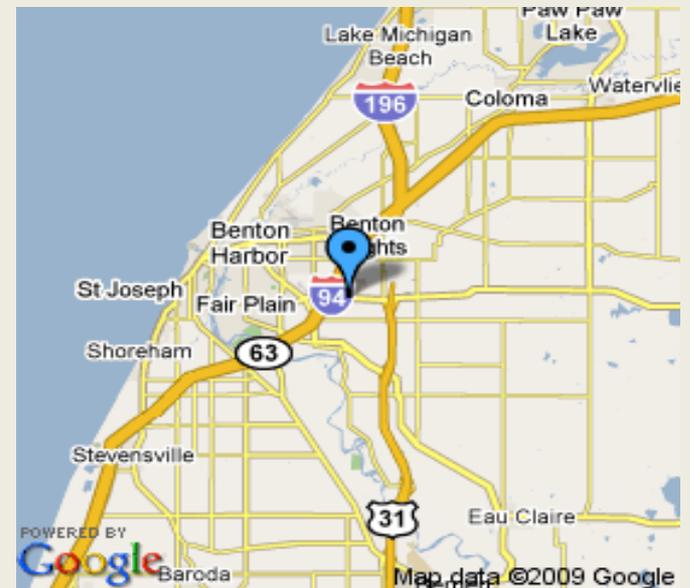


# Lake Michigan College



Lake Michigan College

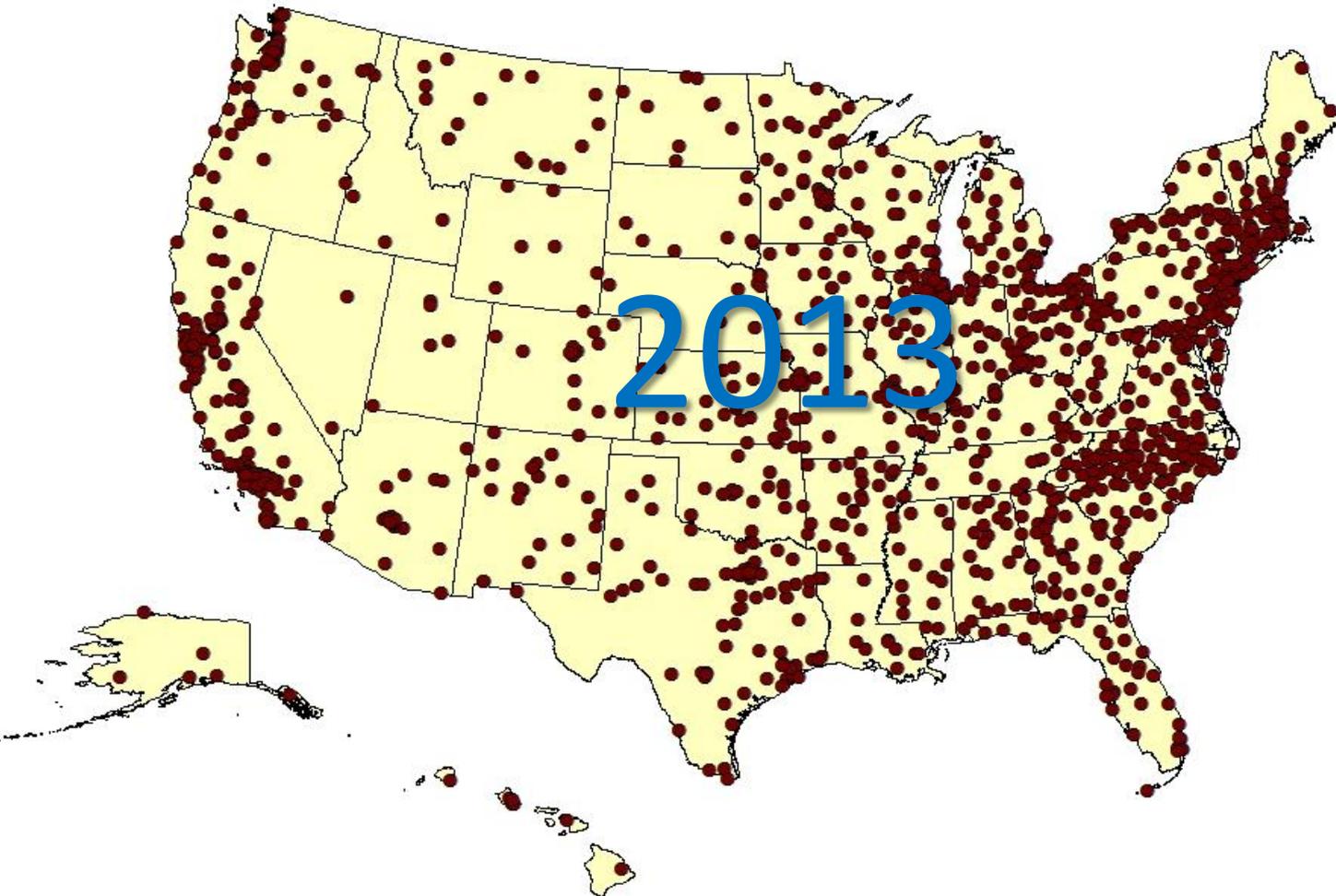
Photo by John Petroel



American Association of Community Colleges

# Community Colleges in the U.S.

## Community Colleges Growth by Decade



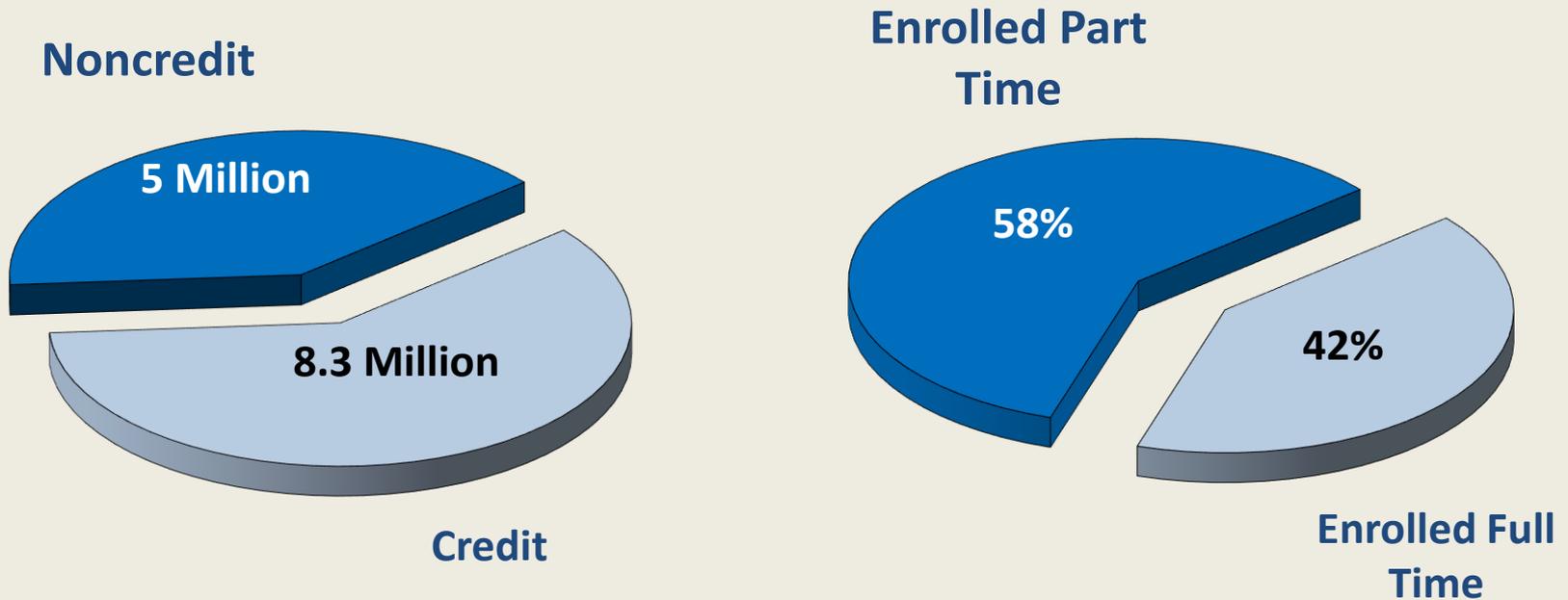
Decade	# of CCs
2011	12
2000	49
1990	48
1980	149
1970	497
1960	82
1950	92
1940	58
1930	106
1920	49
1910	25

Total Colleges: 1167

# America's more than 1100 Community Colleges Educate

- 46% of all U.S. undergraduates
- 50% of new nurses and the majority of health care workers
- 80% of credentialed first responders including firefighters, EMTs, and law enforcement officers
- More than 50% of minority undergraduates
- 57% of adult learners 40 to 65 years of age

# 13.3 Million Total Enrollment (Fall 2011)



Source: **Preliminary** data National Center for Education Statistics, 2011. IPEDS Fall Enrollment Survey (AACC analysis) and AACC membership database (AACC analysis).

**Learning steps for chemistry, trigonometry, or calculus—are the same for learning anything else in life. The brain needs the same steps to occur in all instances in order to understand the concepts, technical terms, methodology for solving quantitative problems and offer new perspectives on old problems.**

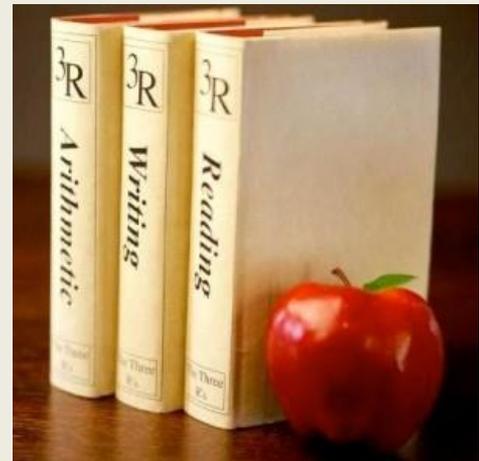
# The 21st Century Student

- Most diverse college students in the nation's history
- 1/3 are students of color
- 1/5 are immigrants or children of immigrants
- Most are from bilingual homes or families in which English is not the primary language
- *Only 16% can be described as "traditional"* in terms of entering college right out of high school, attending full-time, and living on campus



# Three R's Revisited

- **Redesigned** courses for students' educational experiences
- **Reinvent** instructor's role for teaching and
- **Reset** the system to create incentives for student success.

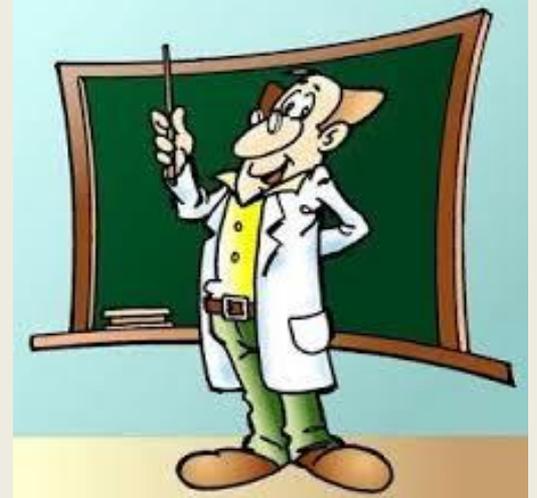


# Redesigned Courses

1. *Increase completion rates* of chemistry courses: while preserving access, enhancing quality, & preparing students
2. Dramatically *improve college readiness*: offer prep science courses to unprepared students
3. Provide *supplemental instruction* to help those who need it.

# Reinvent Instructor's Role

1. Refocus the course *objectives*
2. Invest in *support structures* to serve diverse student population using college resources
3. *Coordinate* with partners in other discipline



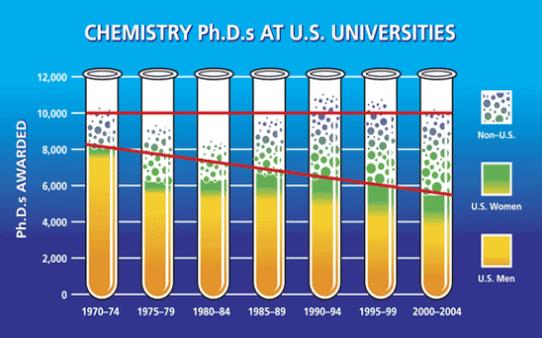
# Reset the System

1. Target strategically to create *new positions, renovation, course offering* by applying for grants.
2. Implement *policies and practices* that promote rigor and accountability for all chemistry courses as outlined in grants.
3. Provide responsibility for learning to all students by a written document

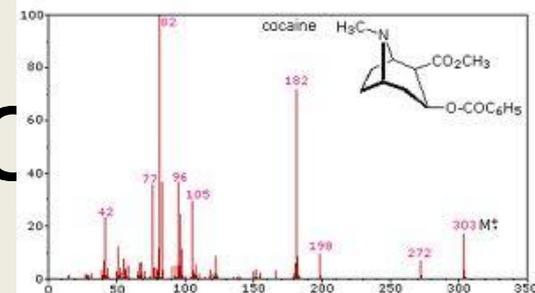
# Myths about community college chemistry courses:

- Less rigorous than courses taken at big university
- Easy to get A grades
- Weak students passed along
- Instructors are less qualified
- High School community chemistry courses





# Chemistry at LMC



## 1. Intro Chem 101:

a) Regular (3hrs of lab/3 hrs lecture with OWL assignments) and

b) Hybrid:

i) Summer only:(4 hrs in-class, 2 hrs-online)

ii) Fall/Spring: Lecture (on-line) and labs (8AM to 5 PM for 5 Saturdays)

## 2. GOB Chem:

- Chem 104 Hybrid only (4 hrs in-class, 2 hrs-online)

## 3. Gen Chem:

- Chem 111 (6 hrs of integrated lab/lecture plus on-line assignment)
- Chem 112(6 hrs of integrated lab/lecture plus on-line assignment)

## 4. Org. Chem

- Chem 203 (3hrs of lab/3 hrs lecture with MasteringChem assignments)
- Chem 204 (3 hrs lecture/ lab with projects or weekly 3 hrs regular lab)



Collaborating with Industry  
to Advance Energy Production

# LMC and Industry



- Supporting Michigan's push toward energy security and improved diversification of energy resources,
- To provide high-quality training to southwest Michigan's energy workforce.
- LMC instructors and experts from Cook Nuclear and Palisades Power plants collaborated to design a curriculum for a nuclear technician training program that has recently received accreditation as a Nuclear Uniform Curriculum Program (NUCP) from the Nuclear Energy Institute and the Institute for Nuclear Power Operations.
- Chem 101/Chem 111 are part of Curriculum Program



# Chemistry Contributes

- **98%** of the LMC 2012 class of registered nurses passed their licensure exam on their first attempt - the national rate was 89%. The class of 2012 is the **9th in a row** to exceed the national average success rate.
- LMC recently received a rating of **AA+** from Standard & Poor's, making it their **highest rated community college in Michigan**. The vote of confidence from S&P will save the College about **\$200,000** in interest.

# The importance community colleges

- Helping online learners
- Students have the opportunity to discuss, in-depth, issues concerning in the online learning environment
- Students learn how to tap help from their peers' it in a way that enhances their learning
- Instructors are available





# online chemistry courses

1. “Students who are taking online courses for the first time often have no idea about the demands of online learning”
2. An online student must possess specific abilities and skills that include **self-motivation**, time management, and **technology proficiency** (Bell, 2006; Kelso, 2009; Lorenzo, 2011; McGhee, 2010).

# Strategies for success

- Alternatives and Before, During, and After class
- *Create opportunities* by offering alternatives i.e. term paper for missed exam or giving an extra test and dropping the lowest score
- Letter/emails/phone calls before
- Reminders during
- Office hours and meeting after class



# Student involvement

- **Critical minds** are questioning minds.
- Students should be encouraged to **ask genuine questions**
- **Encourage them to** probe content by searching for assumptions, misinformation and solutions.
- **Assignments** and student involvement

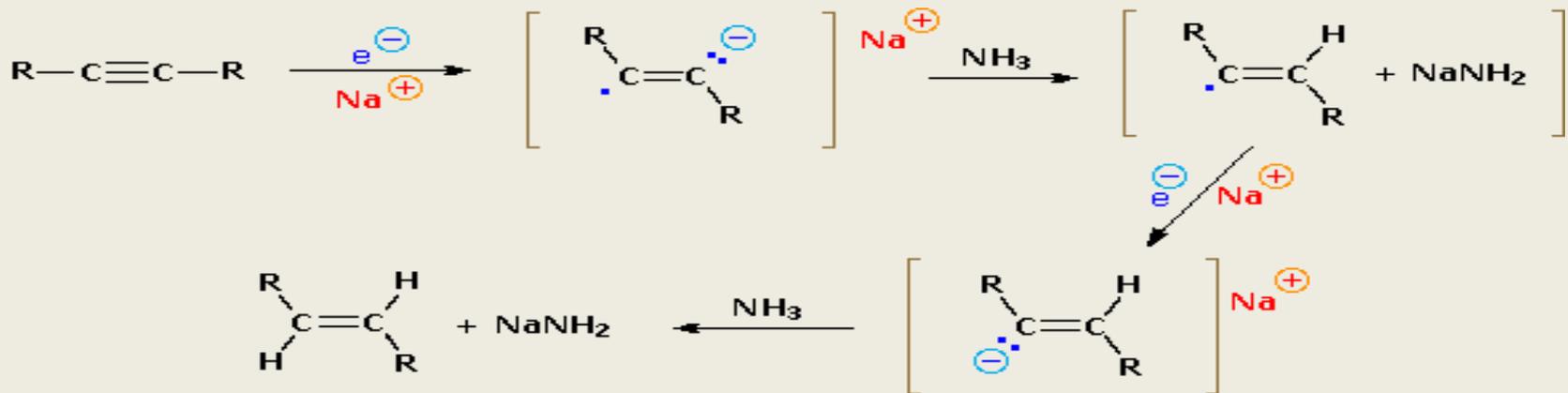
# Multifold teaching

- If things are going well, beware for being blindsided
- Absent students are reminded “we missed you” emails
- Activity based lectures
- Student presentation
- Writing across the curriculum
- Lab report and journal



# Baby steps

- Cultivate thinking skills, stimulate interest in the subject and, motivate students to learn
- Presents material well, makes subject interesting, helpful, and knowledgeable
- Tell stories; example:



# Teaching reduction of alkynes with storytelling strategy

**There's an old legend about a Chinaman whose horse broke out of the corral and ran away. His neighbors sympathized, "Sorry to hear about your horse—too bad." (Negative: Addition of negative electron by sodium in the first step!)**

**The next day the horse returned and led five beautiful wild stallions into the fold. "Good news about your horse returning," the neighbors said. (Positive: Ammonia provides positive proton in the second step!) "Well, we don't know if it's good news or not," said the Chinaman.**

**The next week his son was thrown off one of the wild stallions and the boy broke his leg. "So sorry about your son," said the neighbors. "Too bad he broke his leg." (Negative: Addition of second electron to free radical intermediate!) "Well, we are not sure it's all bad," responded the Chinaman.**

**The next day a military leader came by conscripting all able-bodied young men for the military. The Chinaman's son was exempted because of his disability and all the neighbors rejoiced, "Good news is that your son does not have to go off to war," they said. (Positive: Ammonia provides second positive proton in the last step!)**

# Helping hints

- Intervention strategies
- Extra credit activities
- Science club activities
- Seminars and field trips
- Visit by students from UM, WMU and MSU who had taken chemistry at LMC
- Inviting guest speakers in class



# Tips

- If you enjoy teaching, students will feel it
- To teach or to learn, one must have patience
- Telling appropriate stories will help students remember concept
- Humor makes complex ideas easier to handle
- If you don't have fun teaching chemistry, reflect and ask yourself probing questions!
- Make changes in teaching every term.

# Incorporate change systematically

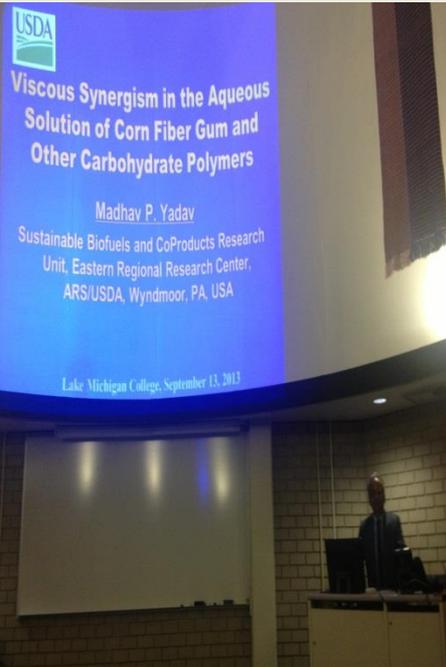
- Comparing the content
- Comparing the textbooks
- Comparing the exams
- What skills are required, do students have those skills. If they don't, how could those skills be developed?



# Realistic Expectations for Success

- Teaching underprepared students isn't going to be perfect
- If all them get 100% something is wrong!!!
- The best learning experience is possible for every student
- Expect mixed results; any new approach will work really well for some students, in some classes, on some days.
- Continue to make positive changes and feel good about it.

# LMC Science Club SEMINAR



**Meet a scientist!**

***Synergism in the Aqueous Mixture of Corn Fiber Gum and Other Carbohydrate Polymers***

**WHEN: Sept. 13, 2013,  
Friday, 12:30 to 1:30**

**WHERE: LMC Planetarium**

**Presentation:**

***By Dr. M. P. Yadav, Ph.D. Research Chemist***

**United States Department of Agriculture  
Eastern Regional Research Center  
Wyndmoor (Philadelphia) PA 19038**

- *Pizza and soft drinks provided, but you must RSVP at:  
[barot@lakemichigancollege.edu](mailto:barot@lakemichigancollege.edu)*

# Chemistry enrollment Fall 2013

<b>CHEM 101</b>	<b>100.0%</b>	Chem 101-- 6 sections
	62.5%	
<b>CHEM 104</b>	<b>100.0%</b>	Chem 104 --5 sections
	62.5%	
<b>CHEM 111</b>	<b>100.0%</b>	Chem 111-- 3 sections
	95.8%	
<b>CHEM 203</b>	75.0%	Chem 203-- 2 sections
	95.8%	
<b>CHEM 101</b>	45.8%	Chem 101-- 6 sections
	79.2%	
<b>CHEM 104</b>	32.0%	Chem 104 --5 sections
	58.3%	
<b>CHEM 111</b>	58.3%	Chem 111-- 3 sections
	58.3%	
<b>CHEM 203</b>	45.8%	Chem 203-- 2 sections
	58.3%	
<b>CHEM 101</b>	58.3%	Chem 101-- 6 sections
	83.3%	

# Conclusion

- Understand about the 21st Century Student at community college
- Redesign courses, Reinvent instructor's role and Reset the department requirements
- Multifold teaching strategies and Realistic Expectations for Success
- Invite changes in teaching content, techniques and class offerings.

# Any question or comment?

