University of Wisconsin-Madison

Chemistry Instructional Addition and Renovation

Project Overview

January 1, 2015

Chemistry Team

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Department Chair

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Building Committee Chair

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Issues – Chemistry Instructional Facilities

Multiple Factors Lead to a Critical Situation

Enrollment Capacity and Space

- Severe enrollment pressure: intro chem (freshmen), organic chem (sophomore)
- Enrollment bottlenecks affect time-to-degree

Programmatic Constraints

- Laboratory component of general chemistry courses cut by 50%
- Ventilation issues adversely impact lab curriculum

Safety

- Inadequate ventilation in labs & support areas
- Fail to satisfy modern lab codes – 2 exit paths from any location

Mechanical Infrastructure

- Air supply and exhaust systems obsolete, failure prone, not maintainable
  - *Failure would shut down existing instructional and research labs*
- Energy efficiency systems are non-functional
- Fume hood exhaust (2nd floor) proximal to residential tower

View from Northeast along University Avenue

Chemistry – Gateway to STEM Disciplines

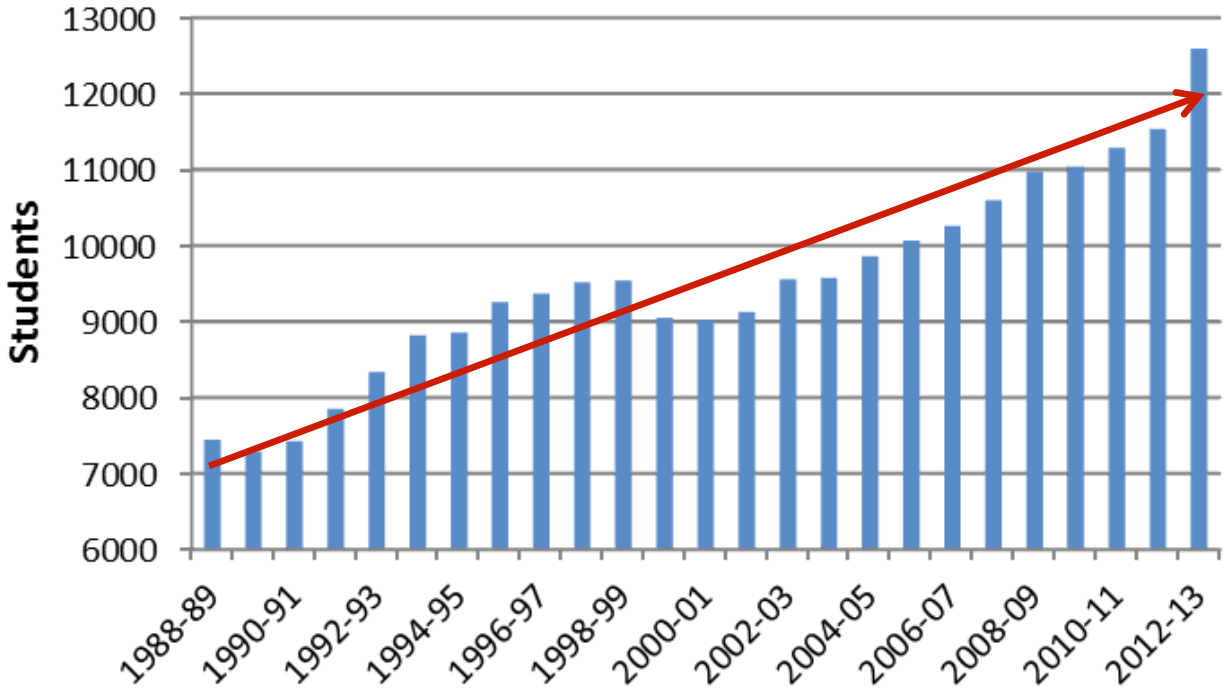
STEM Disciplines
Science, Technology, Engineering, Mathematics
require chemistry courses

- Pre-medicine
- Pre-dentistry
- Nursing
- Pharmacy
- Nutritional science
- Veterinary medicine
- Education
- Agricultural sciences
- Biomedical sciences
- Genetics
- Engineering
- Materials
- Energy
- And many more!

Chemistry Building Project is NOT just about chemistry majors

Enrollment Pressure

Undergrad Chemistry - UW-Madison
Total Enrollment *(including summer)*
25-Year Growth = +70%

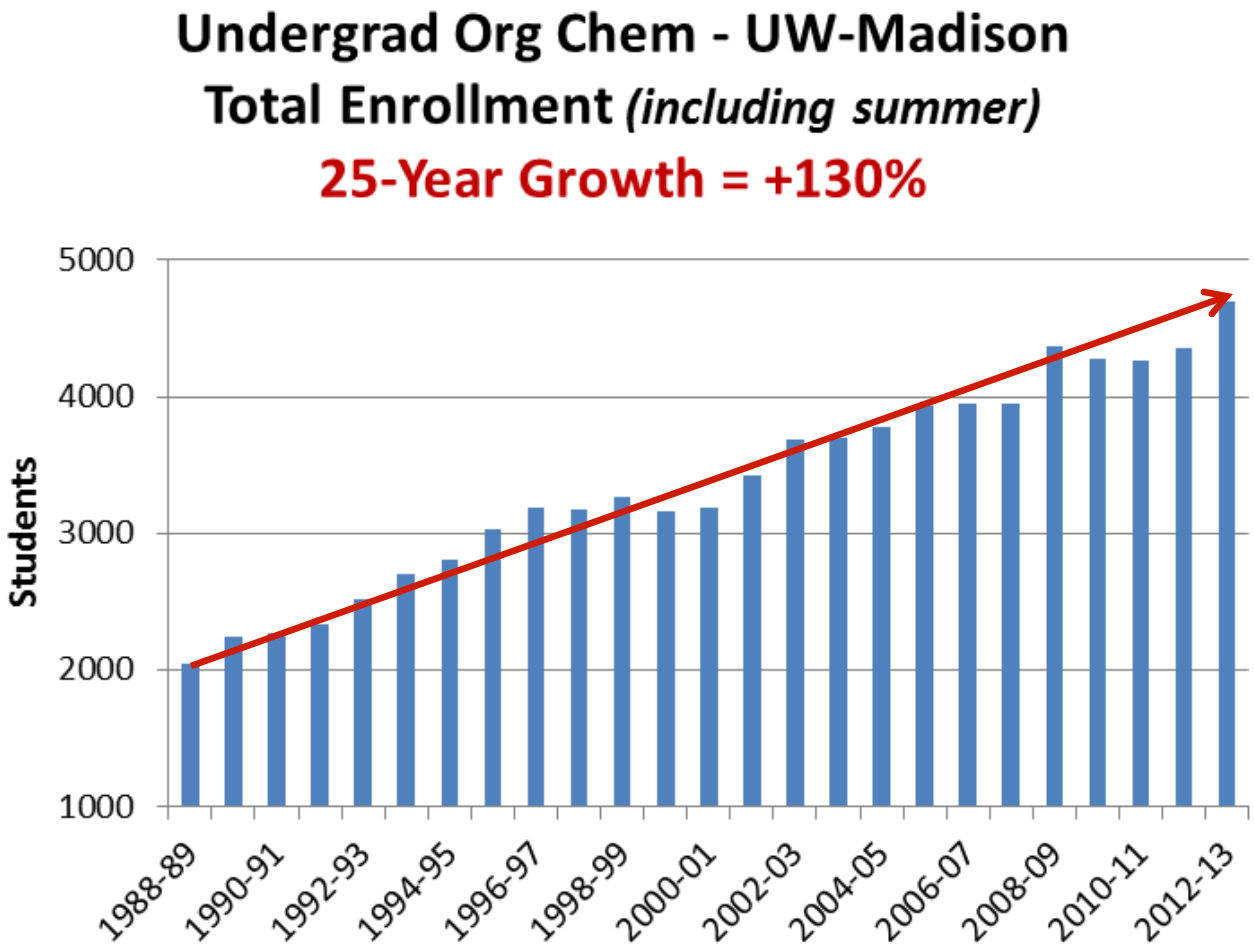


Current instructional laboratory capacity is overwhelmed

General Chemistry: **evening labs + lab content cut by 50%**

Organic Chemistry: **evening labs + large enrollment backlog**

Organic Chemistry: Bottleneck to Graduation



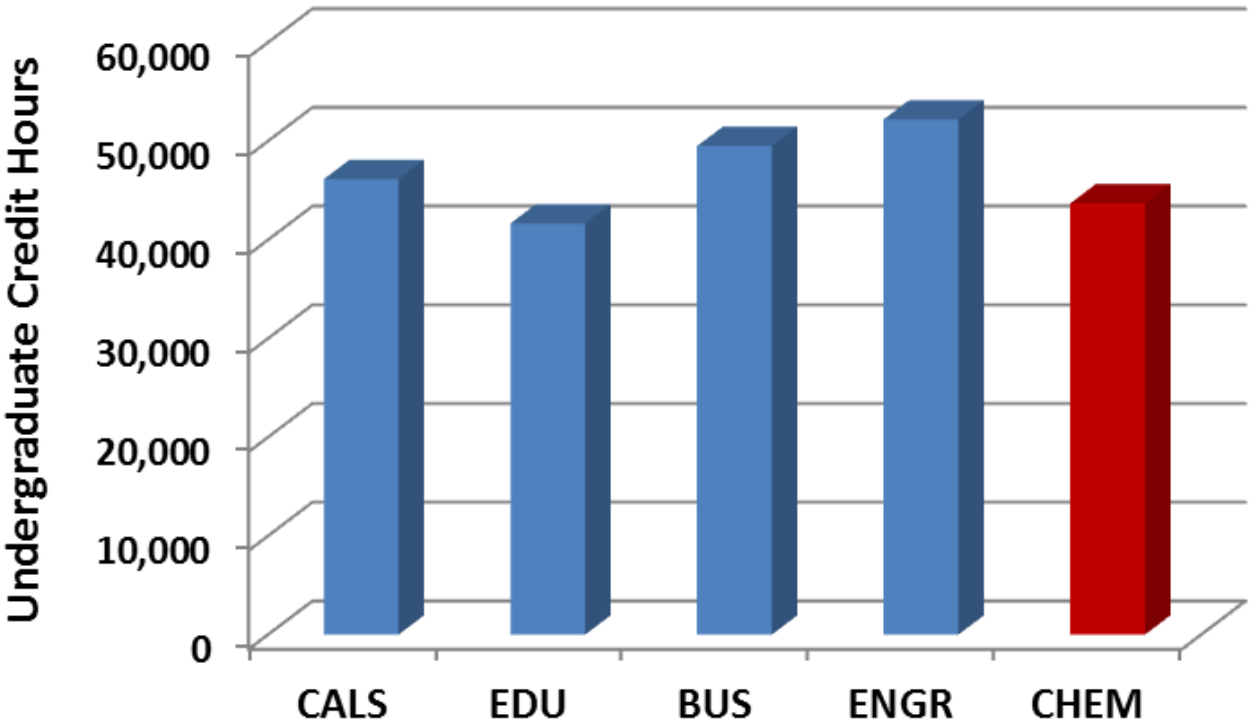
Organic Chemistry courses required for

Medicine, Dentistry, Nursing, Vet Med, Pharmacy

Biological Sciences, Physical Sciences and Engineering

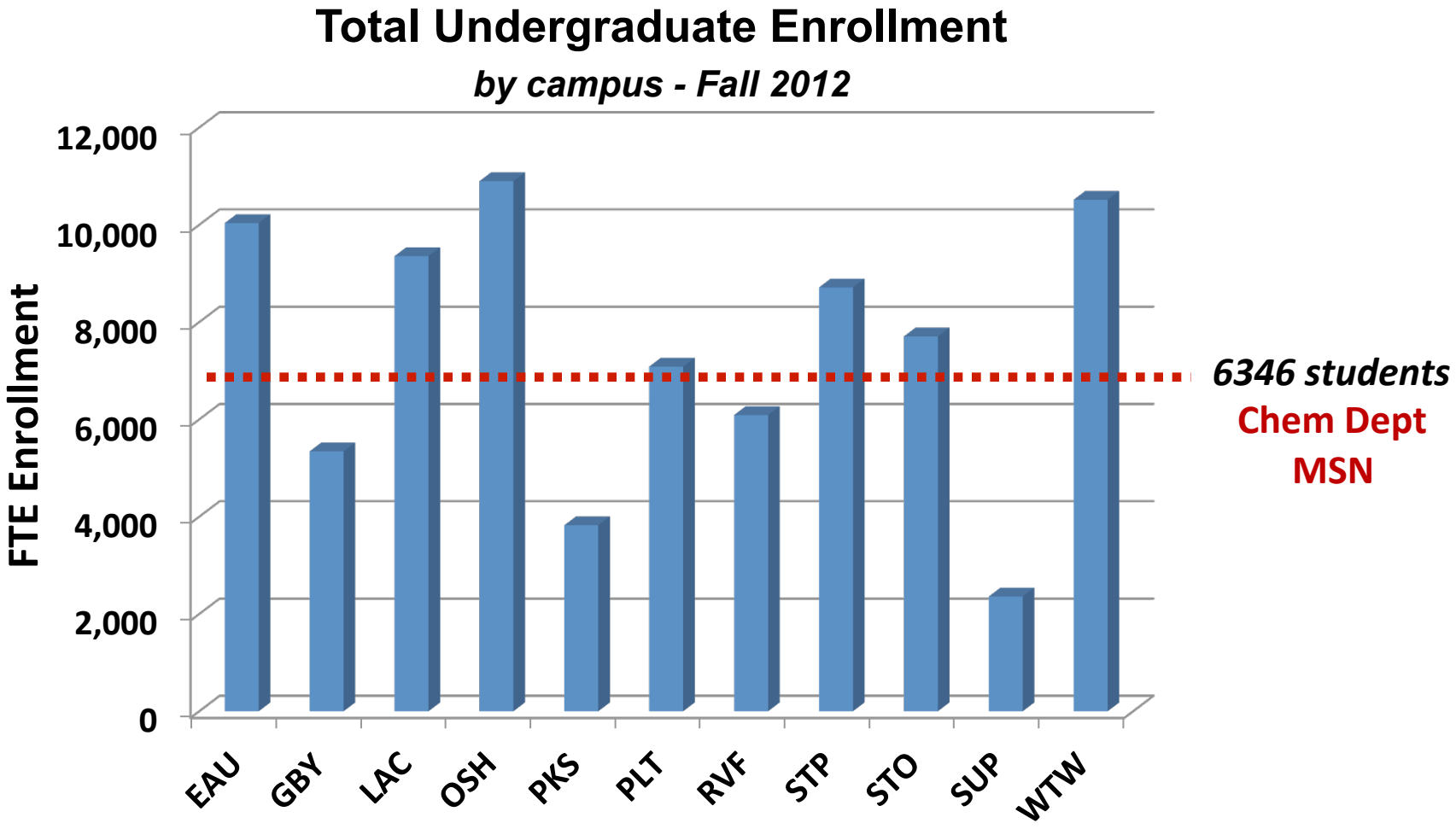
Scale of Instructional Program

Undergraduate Credit Hours *2011-2012*



UW-Madison Department of Chemistry teaches as many undergraduate credit hours as schools/colleges!

Scale of Instructional Program



UW-Madison Department of Chemistry teaches as many undergraduate students as most UW-System campuses!

Present Chemistry Complex

Teaching Labs

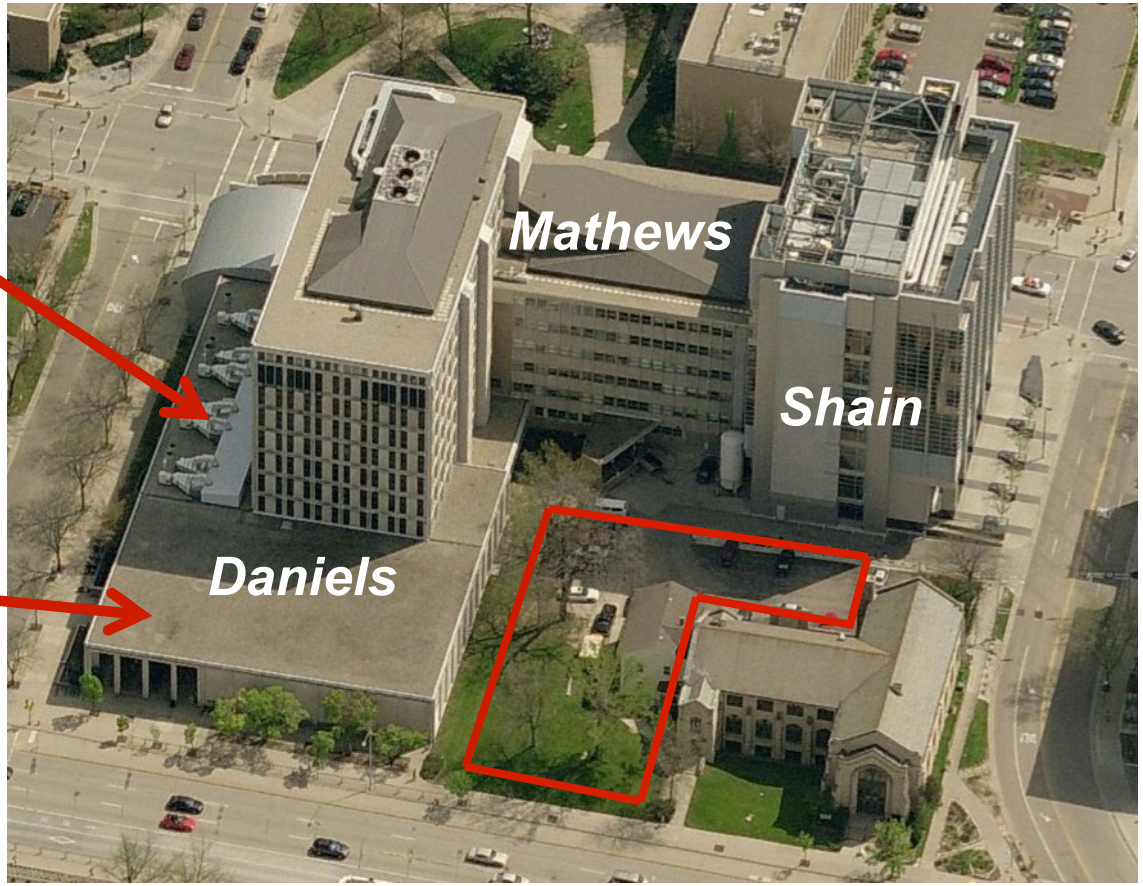
analytical
general
organic

Lecture Rooms

Options for Expansion are Constrained

Teaching Labs
analytical
general
organic

Lecture Rooms



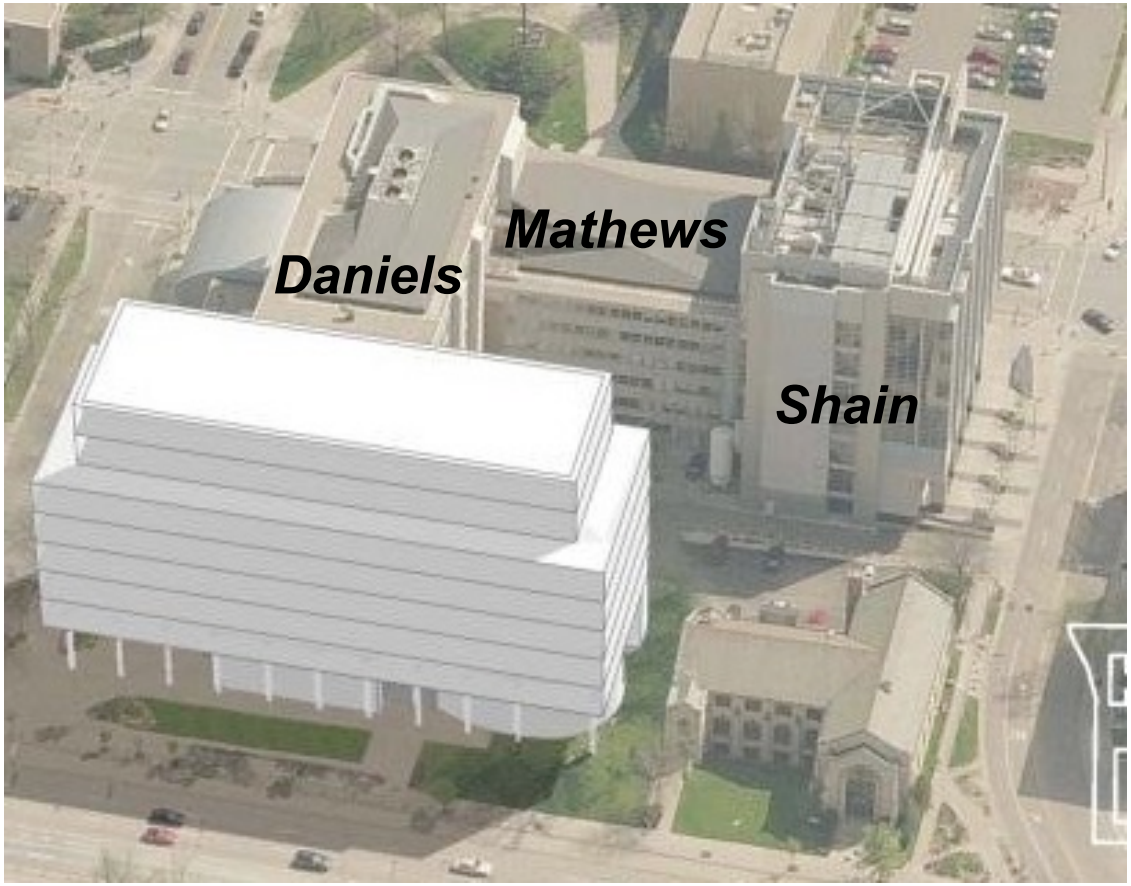
After grappling with this problem since mid-1990s, acquisition of property (2009) finally provided a way forward

Proposed Solution

Mechanical Penthouse

Labs

Lecture Lobby



Building maximizes utilization of the valuable site also enables replacement of HVAC for Daniels/Mathews

Impact on Wisconsin's Students and Economy

Enhance degree programs important to Wisconsin economy

- Medicine, dentistry, pharmacy, nursing, veterinary medicine
- Biotech, engineering, chemical and biological sciences

Accommodate increasing demand for chemistry courses

- 13,000 students per year in safe, modern facilities

Eliminate course bottlenecks to graduation

- Improve student access and time-to-degree

Improve undergraduate chemistry curriculum

- Restore weekly laboratories to general chemistry courses
- Incorporate modern safety practices and safety training

Flexibility to adapt to future needs

- Improve teaching, learning, innovation

Mechanical rehabilitation of Mathews / Daniels buildings

- Vast improvement of energy efficiency of chemistry complex
- The ONLY strategy to maintain these buildings for 20-40 years

Facilities at Peer Institutions

Peer Institution	*Undergrad Organic Lab*	*Renovated*
Univ. California, Berkeley	8’ hood shared by two students	1988, 2012
Univ. California, Los Angeles	ventilation across benchtop	1992
Univ. Illinois, Urbana	8’ hood shared by two students	1992, 2007
Indiana University	individual 4’ hood per student	1988
University of Michigan	8’ hood shared by two students	1988
University of Minnesota	8’-12’ hoods for 2-5 students	1987
Univ. North Carolina	individual 4’ hood per student	1984
Northwestern University	8’ hood shared by two students	1988, 2008
Ohio State University	individual 4’ hood per student	1986
University of Washington	8’ hood shared by two students	1994
Univ. Wisconsin-Madison	*No Hoods Available to Students For Laboratory Experimentation*	*1965*

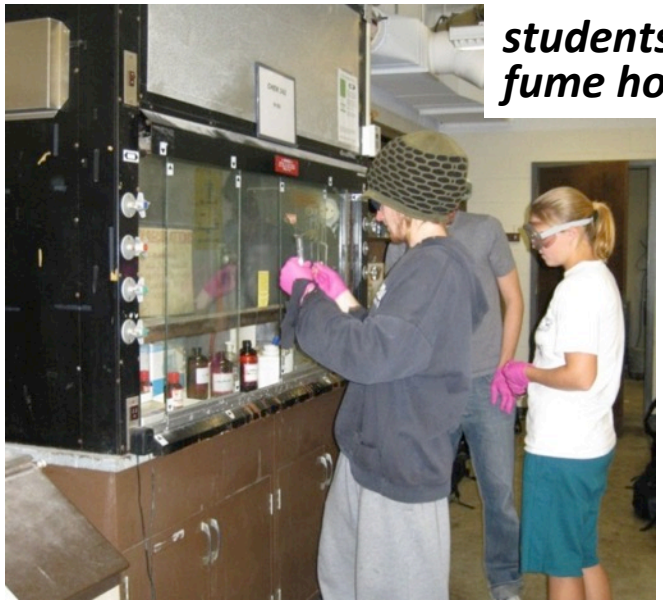
Program & Vision

- **Provide Facilities Commensurate with Scale of Existing Instructional Program**
  - Current Program is Dramatically Constrained
  - Existing 70,000 ASF Increases to 125,000 ASF
- **Construct / Renovate Modern Instructional Labs**
  - Restore Weekly Lab Sections for Chem 103
  - Eliminate Enrollment Bottleneck for Chem 344
  - Adjacent Lab & Write-Up Space
  - Improve Stockroom / Instrumentation Spaces
- **Replace Cramped, Obsolete Lecture Halls**
  - Enhance Interaction – Table/Chair Model
  - Enable Modern Techniques and Technologies
- **Enhance Programmatic Space**
  - Learning Center – 'At Risk' Students
  - Majors and Student Organizations
  - Lobby Space – Poster Sessions & Receptions
- **Rehabilitate Infrastructure for Daniels / Mathews**
  - Only Viable Strategy to Maintain the Existing Teaching and Research Facilities

Obsolete Lab with Poor Layout

Existing: Hallways as Study Space

Health and Safety – Laboratory Ventilation



students at fume hood

Critical Objectives – Infrastructure

- Modern Laboratory Ventilation
  - Student Safety is Paramount
- Rehabilitate Air Supply / Exhaust Systems for Existing Daniels / Mathews Buildings
  - Only Viable Strategy to Maintain *Teaching* and *Research* Facilities
  - Extend Useful Life by Decades
- Energy Conservation
  - Heat Recovery System
- Maintainability
- Eliminate Exhaust Discharge at 2nd Floor
  - Proximal to Residential Tower

Capital Budget – UW-System

2013-2015 Requested

Undergraduate Science Laboratory Initiative

1. Chemistry / Biology Building – *UW-Stevens Point* – $75 M
2. Science Lab Building – *UW-La Crosse* – $82 M
3. Chemistry Addition/Renovation – *UW-Madison* – $103.5 M
4. Babcock Hall Dairy Plant Addition – *UW-Madison* – $31.9 M
5. Meat Science and Muscle Biology Laboratory – *UW-Madison* – $42.9 M
6. etc …

2013-2015 Approved

1. Chemistry / Biology Building – *UW-Stevens Point* – $75 M
2. Science Lab Building – *UW-La Crosse* – $82 M

Deferred → 3. Chemistry Addition/Renovation – *UW-Madison* – $103.5 M

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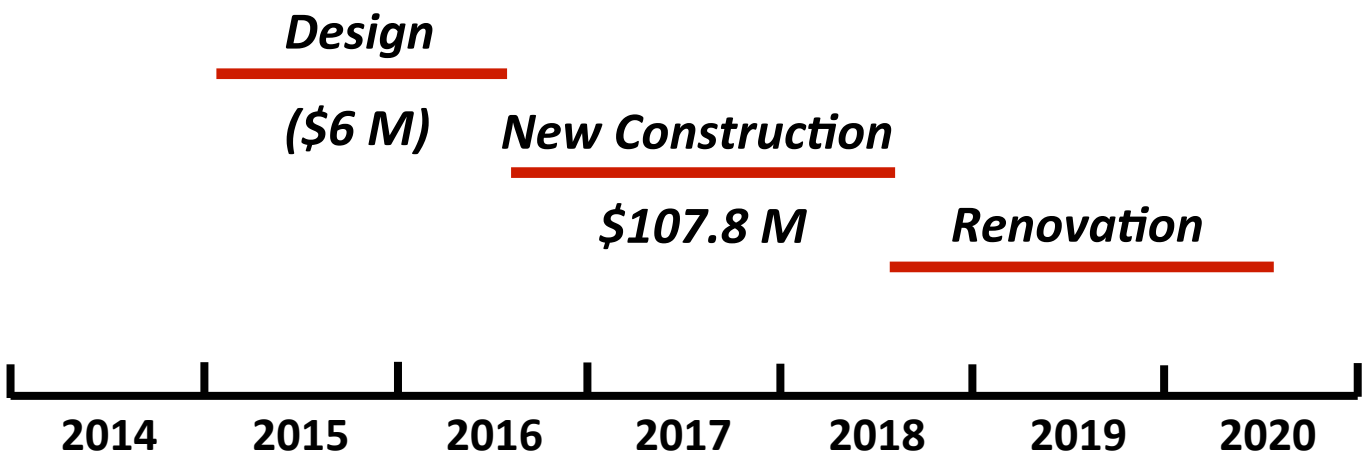
Capital Budget Request – UW-System

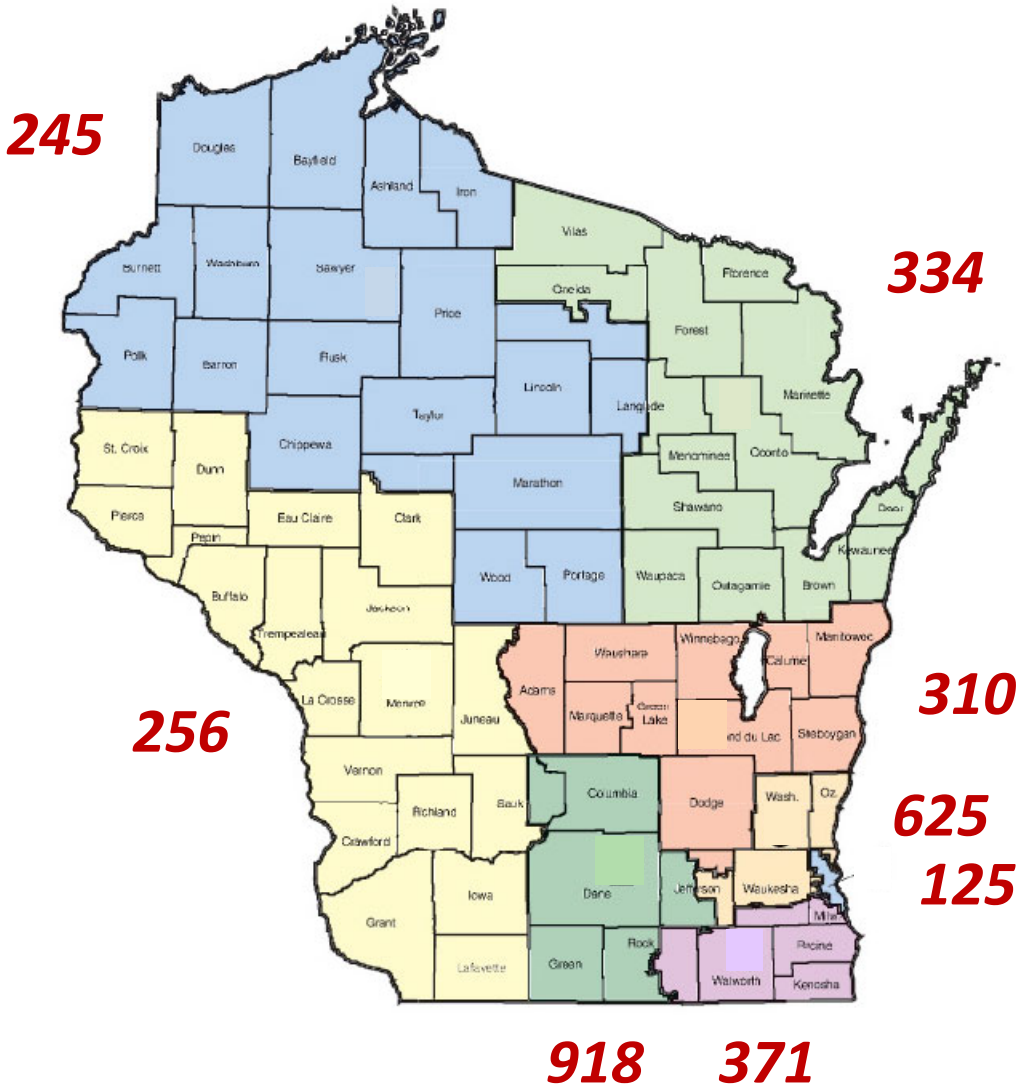
2015-2017 Requested

1. Boebel Hall Renovation, Phase II – *UW-Platteville* – $19.7 M
2. Chemistry Addition/Renovation – *UW-Madison* – $107.8 M
3. Innovation Campus – *UW-Milwaukee* – $75.0 M
4. Wyllie Hall Renovation, Phase I – *UW-Parkside* – $29.4 M
5. etc …

Space Assessment and Feasibility Study – Ballinger / Aro-Eberle 2012
Identifies comprehensive scope of need as $154 M



Serving Wisconsin Students



5,488 Total Enrollment Undergrad Chem Courses

4,927 unique students
- 2,609 intro chem
- 1,646 organic chem
- 672 all other chem

3,184 Wisconsin Residents
- 65% of unique students
- on par with campus average

Geographic Distribution of Wisconsin Residents Taking Chemistry at UW-Madison Spring 2013 By Congressional District

Impact on Wisconsin's Students and Economy

- Huge impact on undergraduate students
- Supports well paying jobs in Wisconsin's economy
- Dramatic improvements in laboratory safety
- Vast improvement in energy efficiency
- Critical mechanical rehabilitation of existing buildings
- *The need is urgent*

Chemistry Instructional Addition and Renovation

A Project of Great Scope and Impact for Wisconsin