University of Wisconsin-Madison

Chemistry Instructional Addition and Renovation

Project Overview

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Chemistry Team

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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

Undergrad Org Chem - UW-Madison
Total Enrollment (including summer)
25-Year Growth = +130%

Organic Chemistry courses required for
Medicine, Dentistry, Nursing, Vet Med, Pharmacy
Biological Sciences, Physical Sciences and Engineering
UW-Madison Department of Chemistry teaches as many undergraduate credit hours as schools/colleges!
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

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

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

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

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
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
5. Meat Science and Muscle Biology Laboratory – *UW-Madison* – $42.9 M
6. etc ...
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

Design

($6 M) New Construction

$107.8 M Renovation

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*
A Project of Great Scope and Impact for Wisconsin