GREEN CHEMISTRY & COMMERCE COUNCIL
Business Mainstreaming Green Chemistry

GC3 Advancing Green Chemistry Education:

Project Update and Discussion

9th Annual
GC3 GREEN CHEMISTRY & COMMERCE COUNCIL
Innovators Roundtable
MAY 28–30 2014
St. Paul, Minnesota
Hosted by 3M

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Objective

GC3 Advancing Green Chemistry Education project group explores ways to enhance green chemistry education in universities and through professional development

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Today's Session

1. Background for the Discussion
   - Green Chemistry/Safer Alternatives Training Update
   - Other Collaborations
   - Statements, Checklists and Commitments
     - GC3 Policy Statement in Higher Education
     - Green Chemistry Checklist
     - Green Chemistry Commitment
2. Discussion
   - Feedback on Webinar training
   - Brainstorm on Mainstreaming through Education Efforts

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Green Chemistry and Safer Alternatives Training

Objective:

- To increase awareness and knowledge of the principles, techniques and applications of green chemistry – for chemists and non-chemists – in order to advance green chemistry and safer alternatives in industry

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Green Chemistry and Safer Alternatives Training

Last year's meeting:

- Level One
  - Webinar series with high level topics

- Level Two
  - In person training using case study models, engaging multiple job functions to enhance communications

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Green Chemistry and Safer Alternatives Training

Which training formats would your company be most interested in?

	No Interest	Some Interest	Strong Interest
Regularly Scheduled Webinars	**7.7**	**53.8**	**38.5**
In-Person Trainings	19.2	65.4	15.4
Online Go-At-Your-Own-Pace Courses	**7.7**	**61.5**	**30.8**
Combination of the Above	13	34.8	52.2

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Green Chemistry and Safer Alternatives Training

Goal:

- To develop a webinar-based green chemistry and safer alternatives training that can be offered to GC3 members and other companies
  - Introductory webinars
  - A few more in depth
  - Recorded (60-90 minute)
  - Additional Resources

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Topics

- Why Green Chemistry Should be Mainstream
- Green Chemistry and Green Engineering Foundations
- Toxicology
- Identifying and Evaluating Safer Alternatives
- Environmental Laws and Regulations
- Communicating Green Chemistry
- Purchasing/Marketing Green Chemistry Innovations

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Audience

All

or

- Bench Scientists [R&D]
- Process/Manufacturing Engineers [Manufacturing Operations]
- Product Designers [Product Design]
- Environmental, Health and Safety Professionals [EHS]
- Marketing and Sales Professionals [Marketing and Sales]
- Purchasing and Contract Professionals [Purchasing and Supply Chain]
- Management and Administration

and Chemists

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Select by:

- topic
- audience
- content area

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Moving Business Toward Safer Alternatives

EDUCATION PORTAL
Introduction
Webinars
Presenters

Chemistry Rating
1 (basically no chemistry) to
5 (hardcore chemistry)

GC3 Webinars

Integrating Toxicity Information into Chemical Design

ORIGINAL WEBINAR DATE: MARCH 18, 2014

Target Audience: All industry sectors

Topic/Job: Chemists, Materials Developers, Designers, Toxicologists, EH&S

Access the Archive: Audio and Slides, Slides Only

Webinar Description
When chemists design new molecules for products, they don't immediately consider whether the chemicals will have toxic effects. Traditionally, this has been the responsibility of a toxicologist at a later stage of product development. If the chemist is told they cannot use a chemical, they frequently choose/design another chemical with similar function and structure to the original which often does not decrease the hazard. Rather than defaulting into a continual loop of measuring toxic effects after a product is created, chemists can start understanding how a change to the structure of a molecule can help avoid toxicity while achieving necessary properties and function. They can use predictive screening tools to start the process of designing inherently safer molecules.

The presenters provide an overview of molecular design tools and how they can be used to design safer products.

Anyone interested in scientific techniques for chemical and material R&D to integrate toxicity into chemical design should watch this webinar but depending on your background a prerequisite is recommended.

Learning Objectives
- Understand the importance of integrating toxicity into chemical design
- Learn about two examples for integrating toxicity into chemical design

Recommendations for Prerequisites
If you do not have a background in chemistry or toxicology, it is recommended that you review the following:

Webinar Listings
Back to Search Tool

Presenters

Martin J. Mulvihill
marty_m@berkeley.edu
Executive Director, Berkeley Center for Green Chemistry
Read Biography

Jakub Kostal
jkostal@gmail.com
Chief Scientific Officer, Sustainability A to Z, LLC
Read Biography

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Status

4 Webinars presented:

- Why Green Chemistry Should be Mainstream
  - **The Value of Green Chemistry**
- Green Chemistry and Green Engineering Foundations
  - **The 12 Principles of Green Chemistry: Sustainability at the Molecular Level**
- Toxicology
  - **Toxicology and Why You Should Care**
  - **Integrating Toxicity Information into Chemical Design**

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Next Webinar

- Green Chemistry and Green Engineering Foundations
  - **Introduction to Green Engineering**
    - Julie Zimmerman, Matthew Eckelman, Julie Schoenung
    - **July 29th 2-3 pm ET**
- **Future Webinar ideas on handout**
  - **Feedback welcome**

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Other Collaborations

- Best Practices for Transitioning to Safer Chemicals
  - 1 day bootcamp hosted by UW DEOHS
  - Early 2015, Seattle, WA
  - Target Audience: EHS professionals, Technical Assistance
- Sustainability and Green Chemistry Certificate Program (tentative)
  - UW PCE - **online**
  - 3-4 courses

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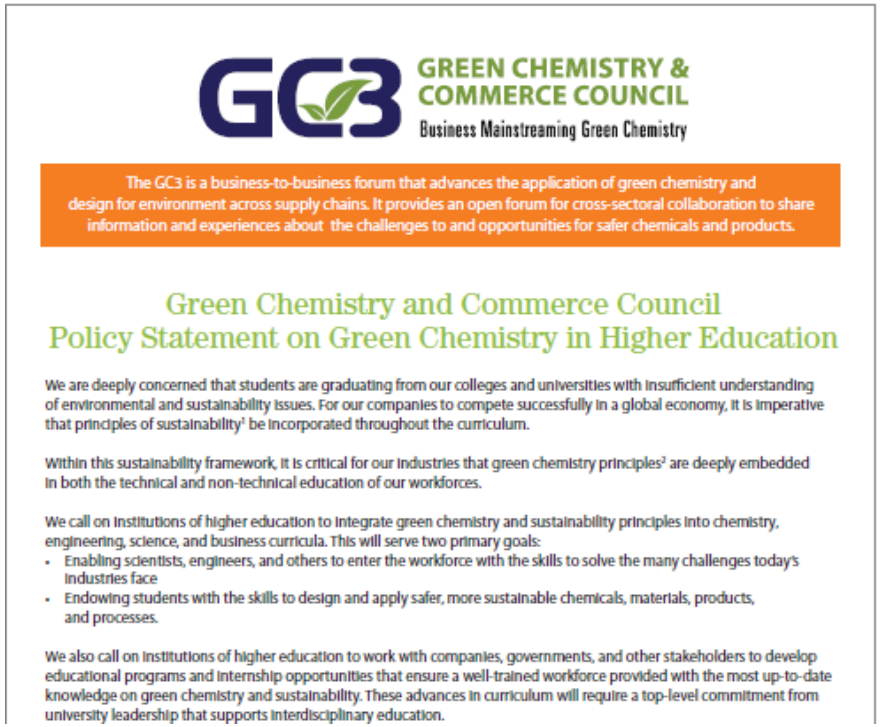
Green Chemistry Education Position Statement



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Business Mainstreaming Green Chemistry

The GC3 is a business-to-business forum that advances the application of green chemistry and design for environment across supply chains. It provides an open forum for cross-sectoral collaboration to share information and experiences about the challenges to and opportunities for safer chemicals and products.

Green Chemistry and Commerce Council Policy Statement on Green Chemistry in Higher Education

We are deeply concerned that students are graduating from our colleges and universities with insufficient understanding of environmental and sustainability issues. For our companies to compete successfully in a global economy, it is imperative that principles of sustainability[1] be incorporated throughout the curriculum.

Within this sustainability framework, it is critical for our industries that green chemistry principles[2] are deeply embedded in both the technical and non-technical education of our workforces.

We call on institutions of higher education to integrate green chemistry and sustainability principles into chemistry, engineering, science, and business curricula. This will serve two primary goals:

- Enabling scientists, engineers, and others to enter the workforce with the skills to solve the many challenges today's industries face
- Endowing students with the skills to design and apply safer, more sustainable chemicals, materials, products, and processes.

We also call on institutions of higher education to work with companies, governments, and other stakeholders to develop educational programs and internship opportunities that ensure a well-trained workforce provided with the most up-to-date knowledge on green chemistry and sustainability. These advances in curriculum will require a top-level commitment from university leadership that supports interdisciplinary education.

Encourage higher education to integrate green chemistry and sustainability principles into chemistry, engineering, science, and business curricula.

Two primary goals:

- Enables graduates to enter the workforce with the skills to solve the many challenges of today's industries
- Provides students with the skills to design and apply safer, more sustainable chemicals, materials, products, and processes.

www.greenchemistryandcommerce.org/assets/media/images/Projects/GC3%20HigherEdPolicy.pdf

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Green Chemistry Education Position Statement

Signatories:

GC3 Companies:
Actio Software Corporation
Anvil Knitwear
Construction Specialties, Inc
Dell, Inc.
Design Tex
Dow Chemical Company
ecoSolv Technologies, Inc.
Green Depot
Herman Miller
Hewlett Packard
Johnson & Johnson
Method Products, Inc.
NatureWorks, LLC
Nike, Inc.
Segetis, Inc.
Seventh Generation
Staples
Steelcase
The Wercs Ltd.
Valspar Corporation

Additional GC3 Signatories:
Center for Environmental Health
Environmental and Public Health Consulting
EPEAT, Inc
GreenBlue Institute
Minnesota Pollution Control Agency
Pacific Northwest Pollution Prevention Resource Center
Pure Strategies, Inc.
Sustainable Research Group
ToxServices, LLC
University of Toledo
WA State Department of Ecology

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The Green Chemistry Checklist

Green Chemistry and Safer Products Business Commitment, v.1.0

2014

Why Green Chemistry?

The Business Case

Customers are increasingly expecting companies to show leadership in developing safer products to protect health and the environment. This creates a market opportunity for innovative companies that are able to bring safer chemicals and products to market.

A commitment to Green Chemistry and Engineering can help demonstrate that leadership. Green Chemistry is a key value proposition for business and can drive profits and regional economic development. Green Chemistry practices can mean cost savings in reduced energy and materials, and new sources of revenue in sustainable products with new performance characteristics. It can also reduce liabilities, like the generation of hazardous waste, by substituting safer chemicals.

The Checklist was developed by the Michigan Green Chemistry Roundtable in cooperation with the Green Chemistry and Commerce Council, and builds on the GC3 Policy Statement on Green Chemistry.

Inside

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Green Chemistry Commitment

The **Green Chemistry Commitment** (GCC) is a consortium program that unites the green chemistry community around shared goals and a common vision to:

- expand the community of green chemists
- grow departmental resources
- improve connections to industry and job opportunities in green chemistry
- affect systemic and lasting change in chemistry education

The Green Chemistry Commitment

TRANSFORMING CHEMISTRY EDUCATION

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Discussion on Webinar Trainings

- Feedback on the webinars- do we have the right mix of webinars?
- Input on Portal? What additional items are needed in the portal?
- How to do outreach on the recorded trainings?
- How do we get people to use it?
  - Would editing help?
  - Segment webinars?

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Discussion on Mainstreaming

- How does the Education group contribute to mainstreaming?
  - What can GC3 do to move education forward?
  - How do we tie to commitments, statements and checklists?
  - Are there other ways GC3 members can communicate with higher education?
- What other Education efforts are out there?