

1. Is Green Chemistry incorporated in courses/labs/research at your institution?
2. Are you aware of the MI Green Chemistry program?
3. Are you aware if the Green chemistry ?
4. Are you aware of the Green Chemistry Commitment?
5. Is your department/your faculty & students ready to commit/demand to include Green Chemistry in the curriculum?
6. What is ONE thing you will need to start working toward commitment to incorporate green chemistry in the chemistry program at your institution

Michigan Governor's Green Chemistry Directive

Executive Directive No. 2006-6, the first Executive Directive in the USA specifically addressing green chemistry

Promotion of Green Chemistry for Sustainable Economic Development and Protection of Public Health

issued by the former Michigan Governor, J. Granholm
remains in effect with Michigan Governor, R. Snyder.

The directive specifically states that all agencies "*shall establish a Green Chemistry Support Program to promote and coordinate state **green chemistry research, development, demonstration, education, and technology transfer** activities in Michigan*"

Michigan Green Chemistry Program

managed by the Michigan Department of Environmental Quality (MDEQ).

Green Chemistry must (to benefit the State of Michigan):

- **protect public health** by fostering the use and development of new chemicals and chemical products that reduce or eliminate the use or generation of hazardous substances
- **stimulate sustainability economic development** by producing high quality products through safe and efficient manufacturing processes.

Green Chemistry (“Support”) Program to promote and coordinate green chemistry activities in areas such as *research, development, demonstration, education and technology transfer.*

Michigan Green Chemistry Roundtable -first convened in May 2008.

What followed

“Advancing Green Chemistry: An Action Plan for Michigan Green Chemistry Research, Development, and Education” (September 2008)

Michigan Green Chemistry & Engineering (*GreenUp*) Conference (2009)

Michigan Green Chemistry Governor’s Award Program (2009)

Funding program to initiate green chemistry focused projects (2009-on)

Green Chemistry Mission and Goals

Agency: Natural Resources

In October 2006, Governor Jennifer M. Granholm issued Executive Directive No. 2006-6 (Directive), "Promotion of Green Chemistry for Sustainable Economic Development and Protection of Public Health." The Directive encourages the research, development, and implementation of Green Chemistry in Michigan and tasks the Department of Environmental Quality (DEQ) with coordinating state-wide implementation. Goals include establishing a Green Chemistry Roundtable as well as developing and promoting a Green Chemistry Program for sustainable economic development and protection of public health.

As outlined in this Directive, the DEQ will establish a Green Chemistry Program designed to do all of the following:

1. Provide encouragement for green chemistry research, development, demonstration, education, and technology transfer.
2. Examine methods by which state government can create incentives for consideration and use of green chemistry processes and products.
3. Facilitate the adoption of green chemistry innovations in Michigan.

- 2013 Green Chemistry Governor's Awards One Page Guidance Document [PDF](#)
- 2013 Green Chemistry Governor's Awards Nomination Packet [PDF](#)
- Michigan Green Chemistry Awards Program
- Green Chemistry Grant Recipients
- Executive Directive on Green Chemistry
- Green Chemistry Action Plan [PDF](#)
- Green Chemistry Roundtable
- Green Chemistry Stakeholder Meeting
- Press Releases - Michigan Green Chemistry Program

Professional organization recommend:



ACS
Chemistry for Life™

CPT

Committee on
Professional
Training

Volume 11, No. 1

Summer 2013

ACS Guidelines Revision

ACS Guidelines Revision *continued from page 1*

allowing individuals who teach primarily laboratory courses to teach more contact hours than those whose primary responsibility is in non-laboratory courses devalues the importance of the laboratory in an approved curriculum.

Integration of modern topics in chemistry into the courses taken for certification: The Committee encourages departments to integrate modern topics in chemistry both in the foundation and in-depth experiences. In-depth courses that fall outside of or integrate the traditional subdisciplines are encouraged. There are a broad range of such topics. Ones that the Committee has received directed feedback on include green/sustainable chemistry and polymer chemistry. Other areas include astrochemistry, computational chemistry, nanochemistry, toxicology, or topics that cut across two or more subdisciplines, for example, bioanalytical chemistry. The Committee has been receiving directed feedback that the revised Guidelines should include a requirement that topics involving



The Green Chemistry Commitment

TRANSFORMING CHEMISTRY EDUCATION

The supporting organization for the Green Chemistry Commitment is *Beyond Benign* (www.beyondbenign.org), a non-profit organization dedicated to providing future and current scientists, educators and citizens with the tools to teach and learn about green chemistry in order to create a sustainable future.

Beyond Benign's vision is to revolutionize the way chemistry is taught to better prepare students to engage with their world while connecting chemistry, human health, and the environment.

Beyond Benign was founded by Dr. John Warner, a founder of the field of green chemistry and co-author of *Green Chemistry: Theory and Practice*.



<http://www.beyondbenign.org/professional/academia.html>





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Why introduce the Green Chemistry Commitment?

During the last two decades, individual teachers, professors, and chemistry departments have introduced green chemistry concepts into lectures and lab activities, and many include green chemistry as the basis for academic research and outreach. The GCC seeks to build on the efforts of leaders in the field to systemically change chemistry education.

The **GCC** is helping to *transform chemistry education* in college and university chemistry departments who strive to:

- prepare world class chemists whose skills are well aligned with the needs of the planet and its inhabitants in the 21st century, and
- design and develop innovative, efficient, and environmentally sound solutions to the safety and effectiveness of chemical products and processes.



Who is part of the Green Chemistry Commitment?

Colleges, universities, and industry leaders are signing the Green Chemistry Commitment for access to shared up-to-date resources, collaborative discussions, improved curriculum, and accountability to track progress on specific learning and research goals.



The Green Chemistry Commitment is shaped and led by an *Advisory Board* currently comprised of faculty members from chemistry departments across the United States, representing large and small academic institutions. Upon launch of the Commitment, the Advisory Board will be expanded to include community college and K-12 educators, industrial scientists and leaders, and scientists serving in administrative programs.





The Green Chemistry Commitment

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Current Advisory Board Members:

- John Arnold, Professor, Dept. of Chemistry, University of California, Berkeley
- Ed Brush, Professor, Dept. of Chemistry, Bridgewater State University
- Rich Gurney, Associate Professor and Chair, Dept. of Chemistry and Physics, Simmons College
- Jonathan Kenny, Professor, Dept. of Chemistry, Tufts University
- Irv Levy, Professor and Chair, Dept. of Chemistry, Gordon College
- Martin Mulvihill, Executive Director, University of California Berkeley Center for Green Chemistry
- Anne Marteel-Parrish, Creegan Chair in Green Chemistry, Associate Professor, Dept. of Chemistry, Washington College
- William Petuskey, Professor and Chair, Dept. of Chemistry, Arizona State University
- William Tolman, Professor and Chair, Dept. of Chemistry, University of Minnesota
- John Warner, President and CTO, Warner Babcock Institute for Green Chemistry
- Wei Zhang, Associate Professor, Dept. of Chemistry, Director of the Center for Green Chemistry, University of Massachusetts Boston
- Nicholas Anastas, Green Chemist, U.S. EPA Region 1





The Green Chemistry Commitment

TRANSFORMING CHEMISTRY EDUCATION

The Green Chemistry Student Learning Objectives

Signing institutions agree that upon graduation, all chemistry majors should have proficiency in the following essential **green chemistry competencies**:

- Theory
- Application
- Laboratory skills
- Toxicology





The Green Chemistry Commitment
TRANSFORMING CHEMISTRY EDUCATION

The Green Chemistry Student Learning Objectives

Signing institutions agree that upon graduation, all chemistry majors should have proficiency in the following essential **green chemistry competencies**:

Theory: Have a working knowledge of the twelve principles of Green Chemistry

Application: Be prepared to serve society in their professional capacity as scientists and professionals through the articulation, evaluation and employment of methods and chemicals that are benign for human health and the environment

Laboratory Skills: Possess the ability to assess chemical products and processes and design greener alternatives when appropriate

Toxicology: Have an understanding of the principles of toxicology, the molecular mechanisms of how chemicals affect human health and the environment, and the resources to identify and assess molecular hazards





The Green Chemistry Commitment

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Two Michigan Universities Commit to National Green Chemistry Leadership Program

Grand Valley State University and Michigan Technological University have joined as inaugural signers to the Green Chemistry Commitment. Grand Valley State is one of a few institutions in the country that offers a Certificate in Green Chemistry for chemistry majors. Michigan Tech has a continuing commitment to sustainability and environmental research.

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What are you signing up for?



The Green Chemistry Commitment
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- **A collective voice:** The Commitment offers an opportunity for the field to unite around common student learning objectives, which will be reviewed on a periodic basis by the Commitment's Advisory Board. Through a collective voice, the Commitment's signing institutions can help to inspire other institutions to get involved with green chemistry and transform their own institutions. Together, signing institutions of the Commitment can also help to influence other initiatives that affect academia, such as funding agencies, degree program certifying institutions, and other governmental and non-governmental organizations.
- **Member benefits:** The Green Chemistry Commitment will gather and create resources for faculty, departments, students and administrators that will be useful for advocating for and implementing green chemistry. Most benefits will remain open to the public, including non-signing institutions. Some benefits may arise that are open to only signing institutions. These member benefits include grants for faculty professional development, grants for faculty and student conference participation, grants for student research, etc. As sponsorship funds become available for these benefits, they will be announced to members and applications will be open to the members of the signing institutions.

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What are you signing up for?

- **Tracking progress:** The Commitment will help to track progress at your own institution, and progress of the community as a whole. Through simple, streamlined reports, departments will track past accomplishment and map out future goals. The accomplishments of participating institutions will be highlighted on the Green Chemistry Commitment website through illustrations and case studies.
- **Shaping the Commitment:** Signers of the Commitment will have an opportunity to serve on the Advisory Board of the Commitment. The Advisory Board is responsible for periodically reviewing the Green Chemistry Student Learning Objectives, reviewing annual reports, guiding resources for member benefits, and providing direction for outreach and advocacy.

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How to commit?

Green Chemistry Commitment is

- Voluntary
- Flexible
- Tracks the progress toward adoption GC theory & practice
- Based on your own institution resources and capabilities

Your department agrees to:

- Progressively incorporate Green Chemistry Student learning objectives
- Submit a streamlined annual report



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GVSU
GREEN CHEMISTRY

Sign Up!

Form A: Signing Form

Form B: Contact Form

Form C: Annual Report



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The Green Chemistry Commitment

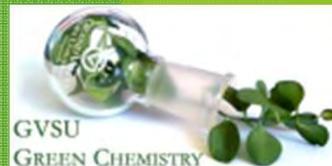
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Form A: Signing Form



We, the department of chemistry at _____
agree with the Green Chemistry Student Learning Objectives outlined in the Green Chemistry Commitment. We are committed to progressively implementing the objectives within our own chemistry department. We will track progress towards the objectives and report our progress on an annual basis. We understand that by signing the Commitment, our faculty will have access to both the public resources and any member-only benefits that may be available to signing institutions and that our faculty will have the opportunity to serve on the Commitment Advisory Board.



GVSU
GREEN CHEMISTRY



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Signed by (to be signed by Department Chair and at least one administrator: i.e., College Dean, Provost, or University President)*:

Name:

(Department Chair, Chemistry)

Name:

(Dean, Provost or President)



GVSU
GREEN CHEMISTRY



The Green Chemistry Commitment
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Report & keep track of progress

Question 1: What courses contain green chemistry content at your institution?

Question 2: Do you have stand-alone green chemistry courses, or do you offer degree track or concentrations for majors in green chemistry? If so, please provide additional information (you may provide a syllabus, or other course materials).

Question 3: Do you offer additional courses, seminars, or content within existing courses in Toxicology, Environmental Science, or other related subjects? If so, please provide the following information: is the course a full course, seminar series, or content within an existing course? Is the course a required course or an optional elective? Please provide any additional information you are able to share (i.e., syllabus, course assignments, etc.).

All materials submitted for annual reports are considered the property of the reporting institution. The GCC must seek permission from the reporting institution to post report information and submitted materials on the Commitment website.

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GREEN CHEMISTRY



The Green Chemistry Commitment
TRANSFORMING CHEMISTRY EDUCATION

Report & keep track of progress

Question 4: What other activities does your department participate in that incorporate green chemistry? (examples include: research, outreach or service learning, etc.) Please provide any additional information you are able to share (i.e., syllabus, publications, course assignments, etc.).

Question 5: What are your short-term department goals for implementing green chemistry and related topics for the upcoming 1-2 academic year(s)? You may provide other documentation that describes goals, including departmental annual reports, or other reports that are required within your institution or for other programs.

Question 6: What are your long-term (5-10 year) department goals for implementing green chemistry and related topics? You may provide other documentation that includes this information, including department annual reports, or other reports that are required within your institution or for other programs.

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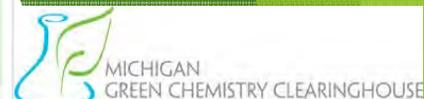
Sign Up!

Why Green Chemistry Commitment?

- All students should have access to Green Chemistry knowledge
- Learning and doing chemistry right the first time
- Students want to learn green chemistry



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