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# **Green Chemistry and the Human Issues Studies Program at Edgewood College**

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# About Edgewood College





# What is the Human Issues Studies Program?

- A graduation requirement for all Edgewood College students.
- An academic program designed to link students' educational experiences to real-world issues, personal values, and community-based service.
- Students may choose a specially designed course or an independent project.



# What is a Human Issue?

- A significant social problem that presents challenges to individuals and society as a whole.
  - Understood through diverse and often conflicting perspectives.
  - Issue involves questions about our lives for which there may be no clear or right answers.



# How Does Chemistry Fit In?

- Not the typical capstone for chemistry
- A program well suited as a capstone course in humanities and social sciences
- A question asked during the search for a new director of the Human Issues program



# Components of a Human Issues Study

- Interdisciplinary Inquiry
- Exploration of Values
- Engaged Learning
- Intellectual and Ethical Growth
- Critical Judgment
- Presentation of Work



# **Requirement for an Independent Human Issues Project**

- Select a Topic
- Find a Mentor
- Complete a Statement of Intent
- Obtain the Human Issues Director's Approval



# Why Get Involved?

- Provide an educational opportunity for students interested in the sciences to fulfill their Human Issues requirement.
- Answer the question, what is Green Chemistry?
- Have students determine aspects of Green Chemistry that can be incorporated in the curriculum.



# MACTLAC

- Midwest Association of College Teachers at Liberal Arts Colleges
- Clark College Dubuque, Iowa
- Theme 2004—Green Chemistry



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# Source of Ideas





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# Old School Green Chemistry





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# New School Green Chemistry





# Interdisciplinary Inquiry

- Environmental Studies
- Marketing
- Education
- Chemistry



# Engaged Learning

- Interview faculty
- Attend meetings
- Find alternate greener labs for chemistry courses, and modify established labs
- Participate in campus events



# Green Chemistry as a Human Issues Project

- Intellectual and ethical growth
  - Learn about environmental impact
  - How did the project change your perspective
- Critical judgment
  - Analysis of survey results
  - Critique educational value



# Presentation of Project

- Natural Science Department Seminar
- Edgewood College Undergraduate Research Conference
- ACS National Meeting
- Council of Undergraduate Research Conference
- Biennial Conference on Chemical Education



# Focus of Human Issues Projects

- What is Green Chemistry?
- Integrate Green Chemistry into curriculum
- Create awareness on campus
- Incorporate Green Chemistry into service learning oriented projects



# Survey Questions and Responses

- What is Green Chemistry?
  - No one had a precise definition but most understood the general principles of sustainability and environmental responsibility.
- Is Green Chemistry an Oxymoron?
  - All stated that it was not.
- What do you think of Green Chemistry?
  - Wonderful, must have sustainability, important since all things are connected, never thought of it
  - Earth spoiled enough, not a simple issue.



# Interview Questions and Responses

- Do you perform work that involves Green Chemistry?
  - Non-scientists: indirectly in teaching environmental policy, model pollution control rather than regulation.
  - Scientists: microscale laboratories, minimizing harmful solvents.
- Can you think of an application to daily life?
  - Non-scientists: household cleaners, driving, lawn chemicals.
  - Scientists: cleaning products, dry cleaning, non-leaching Tupperware, food production.



# Interview Questions and Responses

- How do you think Green Chemistry may benefit society?
  - Non-scientists: saving the earth, interface between consumer society and good ecology, reduce cost associated with waste clean up from poor chemical processes.
  - Scientists: improve image of chemistry, clean up environment, health, quality of life, reduce pollutants, carcinogens, and environmental impact.



# Laboratory Exercises Evaluated

- Solvent-Free Aldol Condensation
  - Used in Organic Chemistry II
- Freezing Point Depression
  - Used in General Chemistry II
- Green Blue Bottle
  - Used in General Chemistry I



# Laboratory Exercises Modified

- Spectroscopy
  - Recycle nickel sulfate
- Chemical Reactions
  - Eliminated barium
- Electrochemistry
  - Eliminated lead
- Equilibrium
  - Eliminated dichromate



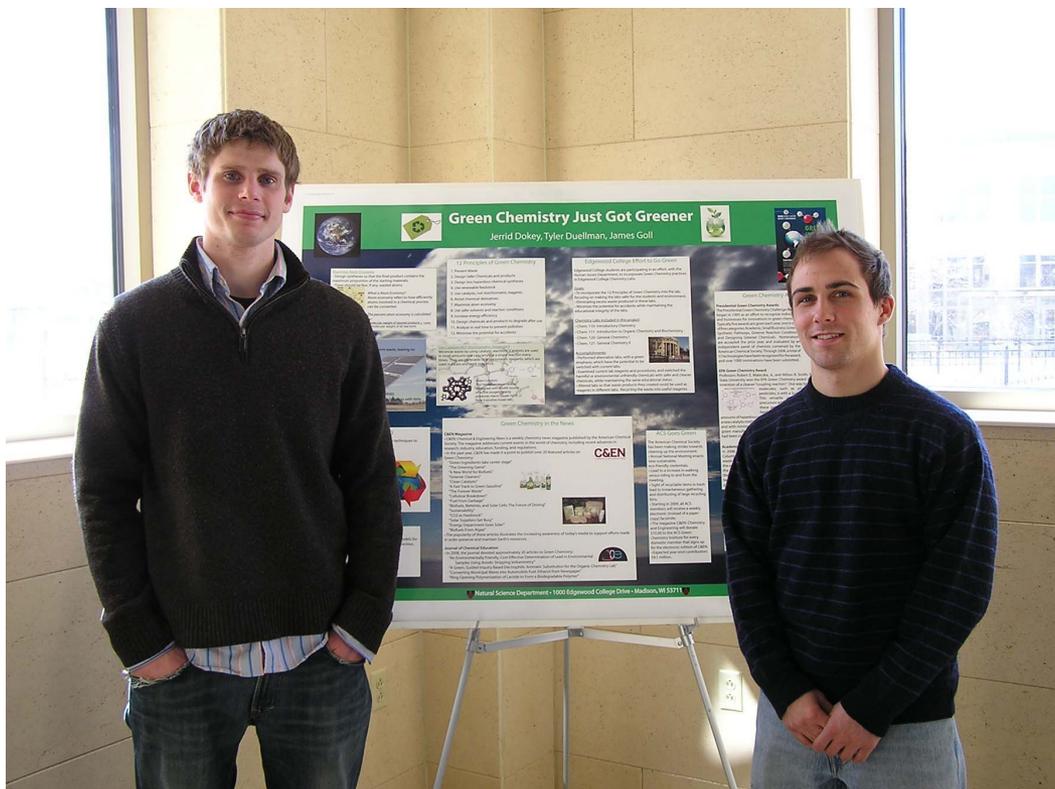
# Laboratory Exercises Under Review

- Oxidation of Fluorene to 9-Fluorenone
- Synthesis of Aspirin using a Microwave
- Calorimetry
- Polylactic acid recycling
- Hydrate
- Seeking easy extraction suitable for introductory students





# Earth Week





# **CSHEMA Conference 2007**

- Campus Safety, Health and Environmental Management Association
- Lab Manager attended this meeting in Boston
  - Include waste handling and treatment in laboratory
  - Monitor use of amounts of chemicals



# WAICU Initiative

- Wisconsin Association of Independent Colleges and Universities 20 members
- Agreement with Federal Environmental Protection Agency and the State Department of Natural Resources to allow compliance audits in seven major environmental protection areas



# WAICU Audits

- Conducted by trained personnel from each of the 16 participating members
- Personnel work with a consultant
- Locations audited
  - Classroom buildings
  - Laboratories
  - Dining, athletics, and maintenance facilities



# Audit Results

- Meet conditions of agreement
  - Report findings
  - Correct violations
- Most EPA penalties are eliminated



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## In the News



- **Milwaukee Journal Sentinel**
- **THURSDAY, Sept. 25, 2008, 11:52 a.m.**  
By [Erica Perez](#)
- **Private colleges sign environmental pact**



# Other Human Issues Projects Involving Chemistry

- The Girls with Yellow Hands: A study of munitions workers that suffered from TNT poisoning during the First World War.
- Goll, James G.; Ley, Jenifer L.; Nytes, Tarah M. The Girls with Yellow Hands. *The Chemical Educator*, **2008**, 13, 3.



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