Delaware State University, Chemistry Department
Special Topic in Chemistry 406/511 – Sustainable and Chemistry
Fall 2015

Course Information
CRN: 15955/16294
Credit: 3 credits
DSU blackboard: N/A
Class time: M, W, 12:00-13:15 pm
Classroom: SC 323

Instructor Information
Full name and title: Cheng-Yu Lai, Associate Professor.
Office phone number: 302-857-6553
Best way to contact: by appointment
Office information: SC 300
Office hours: **M/W/F – 14;00-16:00PM in SCS 300**
E-mail: cylai@desu.edu (please use only for emergencies)

Course Description

"Green Chemistry (Sustainable chemistry) or environmentally benign chemistry is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances." Green chemistry places equal importance on the development of science with the effects the development has on the environment and the global population. Green chemistry breaks away from the traditional methods that solely considered the treatment or abatement of pollution after it was created, and considers alternative routes obviating the need to produce the waste. The "command and control" laws enacted following the formation of the EPA in 1970 have focused on diminishing the risk to the environment by limiting the acceptable levels of disposal. Since the passing of the Pollution Prevention Act in 1990, green chemistry became a formal focus of the EPA. Green chemistry embodies the concept of "benign by design" and involves tailoring or modifying chemical processes to minimize or eliminate hazardous waste from being produced during a chemicals generation, use, and eventual degradation. Green chemistry need not be more difficult or costly than existing technologies and can even be significantly cheaper when waste disposal and remediation are factored into a product's cost analysis. Green chemistry encompasses all chemical related disciplines and provides a method to evaluate and examine all existing processes and products currently being used or created

CHEM 406/511 Lecture is a 3-credit course.

Recommended Course Materials

Textbook: Chemistry of Sustainable Energy - Recommended
ISBN-13: 9781466575325
Also, some of the material will be taken from current literature.

Additional Textbook and Course Material
1. Lancaster, M.; Green Chemistry an Introductory Text, Royal Society of Chemistry, Cambridge, UK 2002. ISBM 0-85404-620-8.
2. Cann, M.C.; Connelly, M.E. Real World Cases in Green Chemistry, American Chemical Society: Washington DC. 2000. ISBN 0-8412-3733-6 (Paperback) (RWCGC).

Website for Downloading Lecture Slides and Course Information

Website: **www.desu.edu/~cylai**
Here will be posted lecture notes and other important documents (Course project details and copy of this syllabus). Please visit often for updates

Student Learning Objectives

Course learning objectives/outcome. Students will:	Assessment method	Alignment to program(s) learning goals
(i) Become active learners in the class and follow class rules.	Students' class performance includes **class attendance** and **class activities**. Attendance will be evaluated in points. A maximum 10 points (except for exam days) will be awarded as follows: a). All students who attend the class	Department goal 3. College goal II and IV. University goal II and VI

	will get 5 points. b) An additional 5 points will be awarded at the end of the semester for students who engage in class recitation learning.	
(ii) Upon successful completion of the CHEM 406/511 course, a student should be able to: (1) To understand and present the chemical transformations and chemical processes that are involved in everyday chemical products especially related to community concerns regarding the impact of chemistry on our lives, (2) To formulate fact-based positions on societal issues of chemistry and provide interdisciplinary understanding to support your position, (3) To increase your awareness of the scientific literature dealing with green chemistry and be able to apply the principles of green chemistry to their evaluation, and (4) To present in both written and oral forms a factual based opinion regarding the relative merits of chemical reactions and chemical products on society	Assessment will be performed based on students' performance in **projects** and the course project that will be assigned. Assessment will be performed based on students' performance in exams.	Department goal 2 and 3. College goal I. University goal I and V. Department goal 3. College goal II and IV. University goal II and VI

Evaluation: Grades are assigned according to the college-wide grading system.
100-90=A (**GPA=4.0**)
89-80=B (**GPA=3.0**)
79-70=C (**GPA=2.0**)
69-60=D (**GPA=1.0**)
59-0=F (**GPA=0.0**)

Student's grade for this course will be calculated as indicated below.
Attendance and HW -10 %
Mid Term Papers – Green Existing CHEM 210/211 Lab Manual – 25% (09/30/15)
Sustainable Topic Review – 25% (10/21/15)
Final Project – Vedio Talk 40% (20% from colleagues + 20 % from instructor) (10/26/15-11/23/15)
Grading - 100%

ATTENDANCE: Students are **required** to attend all lectures and recitations. Students will be asked to sign or initial the attendance sheet at the end of the class.

RECITATION: N/A

HOMEWORK. Homework assignments are assigned by "Topic" above and generally constitute questions from the textbook chapters. Each homework assignment will be due at the start of the lecture period following the completion of a "Topic;" you will be reminded of the due date during lecture announcements. No late assignments will be accepted without some approved advanced notice. You will be able to print out the assignment from the course website (under Assignments). Feel free to work with other students on the homework, but you must turn in your own individual set of solutions. Solutions to the homework will be posted on Blackboard after the due date

LATE or MISSED WORK: Students are responsible for completing homework and exams on time. No extensions will be given. Unless prior arrangements are made with the instructor due to an acceptable conflict such as an illness or university business, all exams must be taken on the scheduled date and time (please see below the class policy regarding exams make-up_.

Special Class Requirements (This course will adhere to the university's policy on student conduct and behavior including the use of cell phones found at http://www.desu.edu/sites/default/files/JudicialProcedures(2).pdf). Specific rules for the class are listed below.

1. Exams attendance is mandatory. No make-up exams will be permitted unless student reports a special situation. This

includes: university business (official document needed), medical emergency (regular medical appointment is not counted as medical emergency), and other physical emergencies (relevant official certificate is required).

The official document must be provided along with a make-up slip (which can be downloaded from the instructor website: www.desu.edu/~cylai). The make-up slip must be filled out by the student and signed by student's academic advisor. If student's advisor is not available, please have the make-up slip signed by your department chair.

In situations where you have personal problems that could not be justified (an acute sickness, oversleep, miss the bus, a flat tire etc.) please be aware that the make-up will be considered but the score will start at **75%.**

Exception The final exam is a standardized test and we do not provide make-up. Your absence will be counted as 0 score in the exam.

2. Cheating in any format in any of the exams may directly result in F of the quiz/exam and may be reported to the Department Chairperson of Chemistry for disciplinary action.

3. Silencing your cell phone during the class time is required. Each time of violation is taken as serious disturbance of class and will receive an oral warning. The violation may cause 5 points decrease in the final grade. Repeated violator will be asked to leave class.

4. Students that are disturbing others by talking, making noises, or eating during the class time will be required to leave the classroom. Campus security will be called if the student refuses to leave.

5. Students coming for exams are required to follow rules set by the instructor for the class. These rules include, (i) No cheating can be tolerated; (ii) No cell phones can be used as calculators; (iii) Using cell phones in any means during quizzes/exams will be considered as cheating; (iv) Using restroom during quizzes/exams is not allowed until test sheets are submitted.

6. Students who have learning disabilities and/or need special accommodation please directly contact DSU Office of Accessibility Service (http://www.desu.edu/academics/office-student-accessibility-services). We will coordinate the examinations with this office.

Lecture Schedule (Tentative: minor changes might me made during the semester; students will be promptly informed)

2015 Fall Chem 406/511 ***Tentative*** Lecture Schedule

Possible Topics to be covered in SusChem Course

Theme	Topics / Content
Unit 1 : Introduction	Sustainability: Environmental Impact Equation , Ecological footprint and Health Impact
	Applying 12 principles of Green Chemistry and Sustainability Ethics
	Introduction of Molecular Design: How much material do we need and how much is wasted?
	Waste/Pollution prevention/Toxic Metals
Unit 2: Biomass/Biofuel	Introduction of Biomass and Biofuel
	Biodiesel Synthesis and Characterization
	Bioenergy: Using microbes and Enzymes to achieve sustainability
	Catalyst and Biocatalyst
	Chemicals from Biomass
Unit 3: Renewable Energies –	Renewable Energy – Solar, Lithium Ion Battery, Fuel Cell, Wind and Geothermal Energy
	Introduction of Nanotechnology
	Photovoltaic Device / Fuel Cells / Lithium Ion Battery
	Nanomaterial for Energy Conversion
Units 4: Nanoparticle Toxicity and Environmental Sustainability	Nanomaterial Toxicity in House Study
	Green Solvent
	Energy Saving Process : Novel Eco-friendly Synthesis of Nanomaterial from Microwave Synthesis
Unit 5: Sustainable Biopolymer	Introduction of bio-degradable polymer
	Cellulose: fascinating biopolymer and sustainable raw material.
	Biobased Polymer in industry application-Bioplastic
Unit 6 : Global Health Care	Global Climate Change, Air, and Food Safety
	Water and Soil Remediation

Students' Presentation Topics	Possible Presentation Topics: • Alternative Energies • Biofuels • Polymers from Renewable Resources • Global Warming • Life Cycle Assessment • Green Solvents • Sustainable vs Renewable • Food Safety • Chemicals from Biomass • CO2 – Sequestration • Catalysts Development • Process Improvement • Hydrogen Production • Recycling Paper • Recycling Bio-Plastics • Renewable Sources • Process Improvement • Water Purification • Chemicals from CO2 • Government Policy and more….etc.

Please print and sign your name below and return this portion to your instructor.

I have received a syllabus of course Chemistry 406/511 (Fall 2015) containing the grading policy, class requirements, and class rules. I understand that the lecture schedule is tentative and minor changes might be made during the semester. I understand the grading policy, will follow class rules, and fulfill all class requirements.

PRINT your name here:_____,

Signature here: _____, Date: _____.