

CML103 Applied Chemistry: Chemistry at Interfaces I Semester 2014-2015

1 Administrative Trivia

This class meets in IILT2 on Tuesday, Wednesday, and Friday at 10 am. Prof. Narayanan Kurur and Prof. Nalin Pant, in that order, are the lecturers. All administrative issues will be handled by Narayanan Kurur, the course coordinator. The coordinates of the instructors are given below.

N. Kurur (nkurur@chemistry.iitd.ac.in)

Room # MS 733 IIG-2

N. Pant (nalinp@chemistry.iitd.ac.in)

Room # MS 716

Sooner or later you will realize that email is the most convenient way to contact us. However note that only mails sent from your official institute account with CML103 as the subject are read. Both of us will be available in our respective offices on Mondays and Thursdays between 4:30 pm and 5:30 pm for course-related discussions including providing extra help, seeking clarification of material presented in class and following up on aspects of the class.

2 Attendance policy

If your attendance falls below 75%, you will be awarded one grade less than the actual grade that you earn.

3 Grading and Academic Integrity

Two minor exams ($2 \times 20\%$) and a final exam (40%) make up 80% overall grade. You will be allowed to re-take an exam if you were absent on the scheduled date for medical reasons (supported by a medical certificate). The re-exam will be held in the last week of the semester and will include the material taught till then.

Rest of the grade is based on a 150 word write-up ($10 \times 2\%$) of the material discussed in the class during the week that “you” have learnt. The write-up, in your words, will be accepted in electronic form ONLY and are due on dates given in the course calendar.

THERE IS ZERO TOLERANCE FOR INDULGING IN ACADEMICALLY DISHONEST ACTIVITIES LIKE, BUT NOT LIMITED TO, CHEATING, PLAGIARISM, FABRICATION, AND UNFAIR ADVANTAGE.

4 Course contents

Unit processes in organic synthesis, Laboratory vs Industrial synthesis, Role of medium in directing synthetic outcomes, organized media, Natural and synthetic constrained systems (inorganic and organic) for control and reactivity in organic reactions, Phase transfer catalysis, Polymer and other supported reagents for control of reactions, Green Chemistry: Principles of green chemistry; greener approaches to organic synthesis; use of environmentally benign solvents in synthesis; applications of non-conventional synthetic methods for industrial applications, Surface chemistry, Kinetics of catalyzed reactions, Homogeneous and Heterogeneous catalysis: Homogeneous Lewis acid-base catalysts in synthesis with examples of more recent mild catalysts; organometallic catalysts as homogeneous catalysts for applications in organic and polymer synthesis. Examples of organometallic reactions such as olefin metathesis, Suzuki-coupling, Heck coupling, Buchwald coupling etc. Chemistry of zeolites, silica and other heterogeneous acid and base catalysts.

5 References

There is no single book that discusses the subject matter for this course at the required level. Here is a short list of possible books that you could consult (with number of copies in the library in parenthesis).

1. P. W. Atkins and J. de Paula, Atkins' Physical Chemistry, 8th edition, Chapters 22, 23, 25 (Numerous)
2. G. Attard and C. Barnes, Surfaces (copy in Library Photocopy shop)
3. M. Bowker, The Basis and Applications of Heterogeneous Catalysis (copy in Library Photocopy shop)
4. R. P. H. Gasser, An Introduction to Chemisorption and Catalysis by Metals (2 GS)
5. B. C. Gates, Catalytic Chemistry (1 GS)
6. J. Hagen, Industrial Catalysis (1 GS)
7. M. M. Green and H. A. Wittcoff, Organic Chemistry Principles and Industrial Practice (2 TB)