

CHEM 721

N-Heterocyclic Carbenes in Synthesis

Spring 2009

Instructor: Oscar Navarro, Ph.D.

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Office hours: Students are strongly encouraged to meet with the instructor for questions, additional information or any other related matter. Office hours are MWF 10:00-11:00, no appointment required. Any other time can be scheduled by appointment (request by email or in class).

Classroom: TBA

Hours: 2 75 min lectures TR 10:30-11:45

Textbook: "N-Heterocyclic Carbenes in Synthesis" S. P. Nolan, Ed. Wiley-VCH 2006.
ISBN-10: 3-52731400-8

Number of credit hours: 3

Prerequisites: CHEM 422

Course description: This course focuses on the use of N-heterocyclic carbenes (NHC) as ligands in metal-mediated and -catalyzed reactions.

Course objectives:

- To introduce students to N-heterocyclic carbenes as ligands
- To explain different catalytic- and metal-mediated processes and the effect of using different types of ligands
- To provide the student a review of state-of-the-art NHC-based systems

Student learning outcomes: Students who complete this course will be able to:

- Know and describe the synthesis and features of NHC ligands
- Explain catalyzed- and metal-mediated processes and ligand effects
- Relate those concepts to their own research projects if needed

Student Responsibility: It is the student's responsibility to put forth the effort required to learn the material and to become competent with it. The best way of learning is to self-test what you don't know and correct that: this means working on the course, reviewing in a daily basis and using good study habits. Ignoring the subject until three days before the test usually guarantees a failure. If you find yourself having troubles catching up with the subject, the instructor will be happy to help you. Consult him as soon as possible. Reading the corresponding chapter and trying to understand the concepts before going to the classroom is highly encouraged.

Course Policies:

- 1- There will be no makeup exams. If you miss an exam and have a valid excuse, the weighing of the other assignments will be adjusted accordingly.
- 2- Attendance in lecture is mandatory.
- 3- Academic dishonesty will not be tolerated. Cheating in the form of copying, plagiarism, altering information or using cribs on exams will result in judicial proceedings in accordance with the University of Hawaii's policy on academic dishonesty.

Grading and Student Evaluation

Four tests: 25% of the final grade each. **No curves will be applied.**

Student Disabilities

The University of Hawaii is an equal opportunity/affirmative action institution, dedicated to teaching all students and reaching all learners. It is our commitment to make our lectures and classrooms accessible to all students. If you have a disability and have not voluntarily disclosed its nature and the support you need, or you think you might have one, you are invited to contact the KOKUA Program of UH (<http://www.hawaii.edu/kokua/>, phone (808) 956-7511), or talk with the instructor in order to get any accommodation you might need to take the course. This information will be kept confidential. Please do this as early in the course as possible.

TENTATIVE LECTURE SCHEDULE

Week 1	Introduction
Week 2	Cross-coupling reactions catalyzed by NHC-Pd complexes
Week 3	Cross-coupling reactions catalyzed by NHC-Pd complexes
Week 4	Telomerization and aryl amination reactions catalyzed by NHC-Pd complexes/ Test 1
Week 5	Metal-mediated and -catalyzed oxidations using NHC ligands
Week 6	Metal-mediated and -catalyzed oxidations using NHC ligands
Week 7	Hydrosilylation of alkenes and alkynes catalyzed by NHC-Ag complexes
Week 8	NHC-Ni mediated catalysis/ Test 2
Week 9	Chelate and pincer NHC complexes
Week 10	Chelate and pincer NHC complexes
Week 11	Spring Break
Week 12	NHC-Ru complexes in olefin metathesis
Week 13	NHC-Ru complexes in olefin metathesis/ Test 3
Week 14	Cu-, Ag- and Au-NHC complexes
Week 15	Cu-, Ag- and Au-NHC complexes
Week 16	Asymmetric catalysis with NHC-metal complexes
Week 17	Asymmetric catalysis with NHC-metal complexes
FINAL EXAM: Tuesday May 14th, 9:45-11:45, room TBA	