

SYLLABUS – Spring 2022

Main Group Metal Chemistry (26:160:577)

COURSE DESCRIPTION

This graduate level course will cover the basics as well as recent advances and developments in main group chemistry. Special emphasis will be given to the synthesis, properties, and reactivity of main group organometallic compounds.

Several topics of intense current research such as the synthesis of inorganic/organometallic polymers and luminescent materials, the development of powerful Lewis acids, the stabilization of low-valent metal complexes, the realization of multiple bonding in main group chemistry, and the applications of main group organometallic species in homogeneous catalysis will be discussed.

Prerequisite: Undergraduate Level Inorganic Chemistry

INSTRUCTOR

Prof. Frieder Jäkle, Olson Hall; Room 230; Tel. (973) 353-5064

Please use email for contact whenever possible: fjaekle@rutgers.edu

Office hours: Any time upon arrangement (please email)

COURSE MATERIALS

Lecture material will be provided (posted on the web site) and is based in part on the recommended books and to a greater extent on articles from the current literature.

Recommended Texts (optional):

Inorganic Chemistry, 4th Ed. by Housecroft and Sharpe (Pearson, 2012). ISBN-10: 0273742752 or any other general text on Inorganic Chemistry you may have from your undergraduate studies.

Organometallics, 3rd Ed. by Elschenbroich (Wiley-VCH, 2006). ISBN: 978-3-527-29390-2

Main Group Strategies towards Functional Hybrid Materials by T. Baumgartner, F. Jäkle, Eds. (Wiley, 2018). ISBN 9781119235958

During the first week of classes the lecture will be delivered over Zoom (link will be shared)

Students should be aware of and follow the University guidance concerning web conferencing: <https://it.rutgers.edu/knowledgebase/etiquette-and-best-practices-for-web-conferencing/>.

Prior to recording, students should notify anyone that may appear in the recording (including any residents where the recording is taking place) that the student is recording a video, in order to ensure that any recordings do not invade any third-party privacy rights.

COURSE INFORMATION

Relevant course information will be posted on Canvas

GRADING

Quizzes / Homework	30%
Abstract / Presentation	30%
Participation	5%
Final Exam	35%

Make-up exams will only be given when legitimate reasons established according to the "University Policy" are presented in writing.

Quizzes/Homework: Short quizzes will be held occasionally during the class periods and graded homework assignments may also be provided.

Student Presentation: Short presentations (**20 mins + 5 mins discussion**) on a specific topic of current interest in the field of Main Group Chemistry will accompany the second part of the semester. The topic for the presentation should be discussed with the instructor.

THE TOPIC HAS TO BE IN THE FIELD OF MAIN GROUP CHEMISTRY AND CANNOT BE THE SAME AS THAT USED FOR ANY OTHER CLASSES. **Please submit tentative title of presentation by March 7th 2022.**

A **typed abstract** (1 page) including the student's name, the title, a brief outline and 3 key literature references should be handed in by **March 14th, 2022**. At least one of the references should refer to original work published within 2020-2022. The grade will be assigned based on the abstract (10%), the slides and scientific content (50%), and the delivery of the presentation (20%). A critically important part will be the discussion of the presentations, hence, 20% of the presentation grade will be based on your participation in the discussion of other students' presentations.

The slides should be sent to the instructor by 9:00 am of the day of the presentation so the instructor can upload them and share with other students prior to the class.

Final Exam: A comprehensive final exam will be held on **May 9th** from **6:20-9:20 pm** and mostly consists of questions that require a detailed written answer.

Make-up exams will only be given when legitimate reasons established according to "University Policy" are presented in writing. If you do not present the proper documentation justifying your absence, a make-up exam will not be given.

Typical grading boundaries:

A 100-85%; B+ 84.9-75%; B 74.9-65%; C+ 64.9-55%; C 54.9-45%.

TENTATIVE COURSE SCHEDULE

Lecture		Topic
1	01/24	Introduction
2	01/31	Overview of Main Group Elements and General Trends
3	02/07	Overview of Main Group Elements and General Trends
4	02/14	Synthetic Aspects
5	02/21	Synthetic Aspects
6	02/28	Characterization
7	03/07	<i>Bonding Aspects: Aggregate Phenomena</i>
	03/14	<i>SPRING BREAK</i>
8	03/21	<i>Bonding Aspects: Metallophilicity, M-M Bonding in Groups 2,12; B Clusters</i>
9	03/28	<i>Bonding Aspects: Low Valent Compounds & Multiple Bonding + PRES</i>
10	04/04	<i>Applications: Lewis Acids; Sensors & Small Molecule Activation + PRES</i>
11	04/11	<i>Applications: Catalysis; Polymerizations + PRES</i>
12	04/18	<i>Applications: Inorganic / Hybrid Polymers + PRES</i>
13	04/25	<i>Applications: Conjugated Materials and Polymers + PRES</i>
14	05/02	TBD + PRES
	05/09	Final Exam: 6:20 – 9:20 pm

[a] Add/Drop period: 01/21-01/25 (add only 01/26), last day to drop with W: 03/21

☐ Absences: Per the University's Course Attendance policy (10.2.7), students are responsible for communicating with their instructors regarding absences. The Division of Student Affairs is available to verify extended absences: (973) 353-5063 or DeanofStudents@newark.rutgers.edu.

☐ Academic Integrity:

As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University's educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here: <http://academicintegrity.rutgers.edu/academic-integrity-policy/>

☐ Accommodation Statement:

Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe learning environment for all students. RU-N has identified the following resources to further the mission of access and support:

- **Students with Disabilities:** Rutgers University welcomes students with disabilities into all of the University's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. In order to receive consideration for reasonable accommodations, a student with a disability must contact ODS, register, have an initial appointment, and provide documentation. Once a student has completed the ODS process (registration, initial appointment, and documentation submitted) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided to the student. The student must give the LOA to each course instructor, followed by a discussion with the instructor. This should be completed as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS: (973) 353-5375 or ods@newark.rutgers.edu.
- *Religious Holiday Policy and Accommodations:* Students are advised to provide timely notification to instructors about necessary absences for religious observances and are responsible for making up the work or exams according to an agreed-upon schedule. The Division of Student Affairs is available to verify absences for religious observance, as needed: (973) 353-5063 or DeanofStudents@newark.rutgers.edu.
- **Counseling Services:** Counseling Center Room 101, Blumenthal Hall, (973) 353-5805 or <http://counseling.newark.rutgers.edu/>.
- **Students with Temporary Conditions/Injuries:** Students experiencing a temporary condition or injury that is adversely affecting their ability to fully participate in their courses should submit a request for assistance at: <https://temporaryconditions.rutgers.edu>.
- **Students Who are Pregnant:** The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy: (973) 353-1906 or TitleIX@newark.rutgers.edu.
- **Gender or Sex-Based Discrimination or Harassment:** Students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, should know that help and support are available. To report an incident, contact the Office of Title IX and ADA Compliance: (973) 353-1906 or TitleIX@newark.rutgers.edu. To submit an incident report: tinyurl.com/RUNReportingForm. To speak with a staff member who is confidential and does **NOT** have a reporting responsibility, contact the Office for Violence Prevention and Victim Assistance: (973) 353-1918 or run.vpva@rutgers.edu.