

Polymer Chemistry (26:160:514)

SYLLABUS

INSTRUCTOR

Prof. Frieder Jaekle

Olson Hall, Room 230

Tel. (973) 353-5064

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

Class Time: Tuesday 6:00-9:00 pm
Office Hours: By appointment on webex or zoom (please email)

COURSE DESCRIPTION

This graduate level course provides an introduction to polymer science for chemists. Special emphasis will be given to the discussion of different synthetic methods for the preparation of polymeric materials and to the evaluation of the unique properties of polymers. Prior knowledge of polymer chemistry is not required.

Several special topics of intense current research such as the development of living or quasi-living polymerization techniques, assembly of block copolymers, the advent of conjugated polymers as (semi)conducting materials and the intriguing field of inorganic and organometallic polymers will be discussed as well.

Prerequisite: Undergraduate Level Organic Chemistry.

COURSE MODALITY

This course is delivered **online** via Blackboard Collaborate Ultra at <https://blackboard.rutgers.edu/webapps/login/>

Lectures will be recorded and posted on the course website.

Videocasts (videos) are protected by copyright laws. The copyright ownership of the videocasts and podcasts vests in either the Professor teaching the course, or to Rutgers University to the extent applicable. The copyright owner of the videocasts grants you a non-exclusive and limited license only to replay them for your own personal use during the course. Sharing them with others (including other students), reproducing, distributing, or posting any copyright protected part of the videocasts or podcasts elsewhere-including but not limited to any internet site-will be treated as a copyright violation and an offense against the honesty provisions of the Code of Student Conduct.

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.

RECOMMENDED TEXTBOOKS

Lecture material will be provided on the course web site and is based in part on the recommended textbooks and articles from the current literature. Numerous textbooks on the topic of Polymer Chemistry available. It is recommended that you secure access to one of them. Relevant literature research papers will be provided during lectures.

Polymer Chemistry, 1st edition by Klotzenburg, Maskos, and Nuyken (Springer), 2017.

This textbook describes the synthesis, characterization and technical and engineering applications of polymers. [The book is available online and can be downloaded free of charge](#)

Introduction to Polymers, 3rd edition by Young and Lovell (CRC Press). 2011.

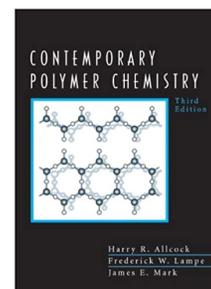
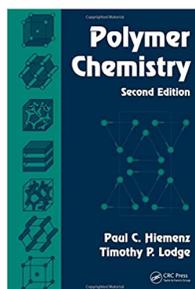
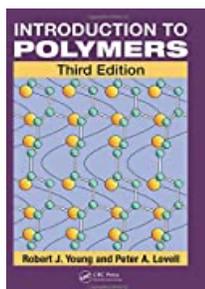
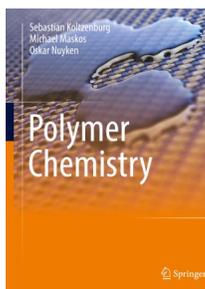
This textbook provides an overview with a good balance of synthetic and physical aspects of polymer chemistry.

Polymer Chemistry, 3rd edition by Lodge and Hiemenz (CRC Press), 2020.

This textbook has a stronger focus on physical aspects of polymer chemistry.

Contemporary Polymer Chemistry, 3rd edition by Allcock, Lampe and Mark (Prentice Hall), 2003.

This textbook provides an overview with a good balance of synthetic and physical aspects of polymer chemistry but is missing some of the newer developments in the field.



GRADING

Quizzes / Homework	35%
Abstract / Presentation	30%
Final Exam (<i>comprehensive</i>)	35%

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

Student Presentation: Short presentations (**15 mins + 5 mins discussion**) on a specific topic of current interest in the field of Polymer Chemistry will accompany the second part of the semester. The topic for the essay should be discussed with the instructor. THE TOPIC HAS TO BE IN THE FIELD OF POLYMER CHEMISTRY AND CANNOT BE THE SAME AS THAT USED FOR ANY OTHER CLASSES. 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 9th, 2021**. At least one of the references should refer to original work published in 2019 or 2020. 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 remotely on Tuesday, May 11th from 6:20-9:20 pm and may consist of questions that require a detailed written answer as well as multiple choice type questions.

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

1	01/19	Nomenclature; Classification
2	01/26	Step Growth Polymers
3	02/02	Free Radical Polymerization; Controlled/Living Polymerizations
4	02/09	Ionic Polymerization
5	02/16	Metathesis Polymerization; Ziegler-Natta Polymerization; Stereoregular Polymers
6	02/23	Ring-Opening Polymerization
7	03/02	Polymer Solution Behavior & Molecular Weight Determination
8	03/09	Polymer Morphology; Thermal Properties; Crystallinity; Liquid Crystals
	03/16	<i>Spring Break</i>
9	03/23	Special Top.: Polymer Reactions + STUDENT PRES.
10	03/30	Special Top.: Conducting Polymers + STUDENT PRES.
11	04/06	Special Top.: Inorganic Polymers + STUDENT PRES.
12	04/13	Special Top.: Polymer Self Assembly + STUDENT PRES.
13	04/20	Special Top.: Emulsion & Suspension + STUDENT PRES.
14	04/27	Special Top.: Fabrication & Testing + STUDENT PRES.
	05/11	Final Exam, 6:20 - 9:20 pm

LAST DAY TO DROP - 1/26/21 LAST DAY TO DROP WITH "W" GRADE - 3/22/21

Academic Calendar: <https://registrar.newark.rutgers.edu/registrar-spring-academic-calendar-0>

❑ 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.