

# Course Change Request

## New Course Proposal

Date Submitted: 09/14/20 12:04 pm

Viewing: **CHEM 472 : Modern Polymer Chemistry**

Last edit: 09/14/20 12:04 pm

Changes proposed by: msikowit

Are you completing this form on someone else's behalf?

### In Workflow

1. CHEM Chair
2. SC Curriculum Committee
3. SC Associate Dean
4. Assoc Provost- Undergraduate
5. Registrar-Courses
6. Banner

### Approval Path

1. 09/14/20 12:07 pm  
Gerald Weatherspoon (grobert1):  
Approved for CHEM Chair

Yes

#### Requestor:

Name	Extension	Email
Chao Luo	3-6417	cluo@gmu.edu

**Effective Term:** Spring 2021

**Subject Code:** CHEM - Chemistry

**Course Number:** 472

**Bundled Courses:**

**Is this course replacing another course?** No

**Equivalent Courses:**

**Catalog Title:** Modern Polymer Chemistry

**Banner Title:** Modern Polymer Chemistry

**Will section titles vary by semester?** No

**Credits:**

3

**Schedule Type:** Lecture**Hours of Lecture or Seminar per week:** 3**Repeatable:** May be only taken once for credit, limited to 3 attempts (N3) **Max Allowable Credits:** 9**Default Grade Mode:** Undergraduate Regular**Recommended Prerequisite(s):****Recommended Corequisite(s):****Required Prerequisite(s) / Corequisite(s) (Updates only):**

CHEM 313, CHEM 314, CHEM 321, and CHEM 331 with a minimum C

**Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):**

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

**Registration Restrictions (Updates only):****Registrar's Office Use Only - Registration Restrictions:****Field(s) of Study:****Class(es):****Level(s):****Degree(s):****School(s):****Catalog Description:**

Synthetic and analytical chemistry of synthetic macromolecules. Topics include polymer solutions, molecular weight determination, spectroscopy, thermal analysis, x-ray crystallinity, polymerization types, and commercial and electroactive polymers.

**Justification:**

Polymer chemistry is a foundational area of materials chemistry. This course is required for the Materials Chemistry concentration and will also supplement elective CHEM course choices for chemistry majors and minors.

**Does this course cover material which crosses into another department?** No

**Learning Outcomes:**

Upon successful completion of this course, you should be able to:

1. Understand the fundamental concepts and principles in polymer chemistry, including polymerization methods, reactions, mechanisms, and kinetics.
2. Describe the polymerization methods developed for synthesizing a range of functional polymers such as polycondensation, free-radical polymerization, free-radical copolymerization, ionic polymerization, coordination polymerization and ring-open polymerization.
3. Understand the history and applications of polymers synthesized from each polymerization method.
4. Discuss safety and technological issues associated with polymer synthesis, development, and applications.

**Attach Syllabus**

[Syllabus for CHEM 472 Modern Polymer Chemistry \(2\).pdf](#)

**Additional Attachments****Staffing:**

Luo and organic faculty

**Relationship to Existing Programs:**

Course needed for Chemistry BS with Materials Concentration. Can also be used as an upper level elective for Chemistry majors from other concentrations.

**Relationship to Existing Courses:**

Crosslist with CHEM 613- Modern Polymer Chemistry. Assignments will differ to distinguish between undergraduate and graduate level.

**Additional Comments:**

**Reviewer  
Comments**

Key: 16887

**George Mason University**  
**Department of Chemistry and Biochemistry**  
**CHEM 472: Modern Polymer Chemistry Syllabus**

Instructor:	Dr. Chao Luo	Day:	Monday
Office:	Planetary 329	Time:	4:30 – 7:10 pm
Phone:	703-993-6417	Building:	ENT
Email:	<a href="mailto:cluo@gmu.edu">cluo@gmu.edu</a>	Room:	277
Office hours:	By appointment		

Modern Polymer Chemistry (CHEM 472) is an undergraduate-level course offered by Department of Chemistry and Biochemistry at GMU. In this course, some of you have a broader organic chemistry and polymer chemistry background, while some of you have limited background knowledge. To be inclusive, all the concepts in class will be presented briefly at the introductory level before extensively applying principles of polymer chemistry in real chemical problems. This class will also cover the applications of polymers in energy and environmental fields. Therefore, it may be necessary for those that do not have a strong background to read additional information to keep up with the course. Please consult the instructor if you are not able to keep up with the course.

For those students who will apply for the graduate program in Department of Chemistry and Biochemistry at George Mason University, a minimum grade of "B" in CHEM 472 is required.

The textbook for this course is **Polymer Chemistry** (2017) by Sebastian Koltzenburg, Michael Maskos, and Oskar Nuyken. The other two books, Malcolm P. Stevens, **Polymer Chemistry AN INTRODUCTION** (Third Edition) and Paul C. Hiemenz, **Polymer Chemistry The Basic Concepts** are recommended as references.

**Prerequisite(s):** CHEM 313, 314, 321, 331 with a minimum grade of "C". For students from The Volgenau School of Engineering, the above courses may not be required, but CHEM 271, 272, 310 and an equivalent engineering course that covers *Thermodynamics & Kinetics* are required. Please note, a "C-" in these courses is below the minimum grade requirement.

## Learning Outcomes

1. Understand the fundamental concepts and principles in polymer chemistry, including polymerization methods, reactions, mechanisms, and kinetics.
2. Describe the polymerization methods developed for synthesizing a range of functional polymers such as polycondensation, free-radical polymerization, free-radical copolymerization, ionic polymerization, coordination polymerization and ring-open polymerization.
3. Understand the history and applications of polymers synthesized from each polymerization method.
4. Discuss safety and technological issues associated with polymer synthesis, development, and applications.

## Assessment

Item	Qty	# points each	Total Points	% age
Homework	3	5	15	15
Mid-Term Exam	1	30	30	30
In-Class Presentation	1	25	25	25
Final Exam	1	30	30	30
Total			100	100%

*No exam grade will be dropped in determining the final letter grade for this course. Different assignments and exam requirements will be used for undergraduate and graduate students.*

## Attendance

Students are expected to attend every class meeting, be punctual, and stay the entire class time. Those who are inexcusably absent from class can expect no aid on course work from the instructor outside of class. Some special topics, review sessions, or make up classes may be scheduled outside of normal class time.

## Schedule

The syllabus lists the topics to be studied during each class meeting. The schedule is subject to change during the semester.

## Assignments

Problems will be assigned as the material is covered in lecture. The homework should be used to cement the lecture material and start preparing for exams. The hardcopy of the homework is required to be turned in at the beginning of the class. Late homework or sending homework by email will not be accepted unless excused and/or prior approval was granted.

## **Use of Technology**

All problems in the course may be solved with the aid of any calculator, phone, computer, or other electronics. However, these electronics used during any administering of any assessment instruments, exams and quizzes, are limited to those approved for use.

## **Academic Integrity**

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. Please see the Office for Academic Integrity for a full description of the code and the honor committee process, <http://oai.gmu.edu/>.

- ALL cell phones and communication devices are to be turned off, properly secured and stored away BEFORE the exams begin. If I find (see or hear) a cell phone on a student during an exam, the student will receive an automatic "F" for the exam, since this is an honor code violation and the matter referred to the [\*Office of Academic Integrity\*](#). The recommendation will be for the student to receive a grade of "F" for the entire course. If another student observes the violation or has knowledge of the offense, yet fails to report it, he/she may also be accused of violating the honor code. Students should not place themselves in a position that appears to support collusion in the honor code violation activity. All parties will be referred to the honor committee with sanctions levied based on the number of offenses and judgements determined by the honor committee. Keep in mind at all times that GMU is an Honor Code university.
- Any form of cheating on the final exam will result in an automatic "F" for the course.
- The standard recommendation for honor code violations will be prosecution to the fullest extent.
- Recommendations regarding honor code violations (HCV) on hourly exams.....first time offenders---a grade of "F" for the hourly exam; repeat offenders--a grade of "F" for the course and suspension/expulsion from George Mason University.
- Recommendations regarding honor code violations (HCV) on the final exam.....first time offenders---a grade of "F" for the course and suspension/expulsion from George Mason University.

## **Disabilities Statement**

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474, <http://ods.gmu.edu>. All academic accommodations must be arranged through the ODS.

## **Mason Diversity Statement**

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self- assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

## **Title IX information**

As a faculty member and designated "Responsible Employee", I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason's Title IX Coordinator (703-993-8730; [titleix@gmu.edu](mailto:titleix@gmu.edu) ).

## **Student Support Resources on Campus**

Resources that you may find helpful may be found at: <http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/>



**Table: Tentative class Schedule**

Date	Topic	Event
Monday, Aug. 26 <sup>th</sup>	Introduction to Polymer Chemistry	
<b>Monday, Sep. 2<sup>th</sup></b>	<b>No Class</b>	Labor Day
Monday, Sep. 9 <sup>th</sup>	Polycondensation and Stepwise Polymerization	
Monday, Sep. 16 <sup>th</sup>	Free-radical Polymerization I	
Monday, Sep. 23 <sup>th</sup>	Free-radical Polymerization II	Homework 1 Due
Monday, Sep. 30 <sup>th</sup>	Free Radical Copolymerization I	
Monday, Oct. 7 <sup>th</sup>	Mid-Term Exam	Mid-Term Exam
<b>Tuesday, Oct. 15<sup>th</sup></b>	Free Radical Copolymerization II	
Monday, Oct. 21 <sup>th</sup>	Ionic Polymerization	Homework 2 Due
Monday, Oct. 28 <sup>th</sup>	Coordination Polymerization	
Monday, Nov. 4 <sup>th</sup>	Ring-Opening Polymerization	
Monday, Nov. 11 <sup>th</sup>	Chemical Reaction of Polymer	
Monday, Nov. 18 <sup>th</sup>	In-class Presentations	Homework 3 Due
Monday, Nov. 25 <sup>th</sup>	In-class Presentations	
Monday, Dec. 2 <sup>th</sup>	Applications of polymers in Energy Storage	Last class
Monday, Dec. 16 <sup>th</sup>	Final Exam	4:30 – 7:10 pm

References:

1. Malcolm P. Stevens, **Polymer Chemistry**, An INTRODUCTION, 1999.
2. Paul C. Hiemenz, **Polymer Chemistry**, The Basic Concepts, 1984.