

CHEM 3346: Macromolecular, Supramolecular, and Nanoscale Chemistry Spring 2023 Course Syllabus

General Course Information

Instructor Contact Information

Section 001 (RBS 2015)

Dr. Shaun Black

Office: RBS 3029

Phone: 903-566-7348

Email: sblack@uttyler.edu

Best method of contact is e-mail



Office Hours

In general, it has been my policy to be available for help any time I am at the university.

Black: T 11:00 AM-1:00 PM
W 10:00 AM-1:00 PM

or, by arrangement

Course Website

Additional information, including our course schedule, can be found at the course *Canvas* website located at uttyler.instructure.com/courses/33638. Look for [2023-SPRING-CHEM-3346.001](#) (*MSN Chemistry*)

Prerequisites

CHEM 3346, *MSN Chemistry*, requires General Chemistry I & II, General Chemistry Laboratory I & II, Organic Chemistry I & II, and Organic Chemistry Laboratory I & II as prerequisites or consent of the instructor.

Course Description

Macromolecular, Supramolecular, and Nanoscale (MSN) Chemistry takes us from our experience in general chemistry, organic chemistry, and biochemistry into the world of macromolecules and macrocomplexes. We will study **Macromolecules** (poly-

mers, plastics, biopolymers), **Supramolecular interactions** (host-guest complexes, self assembly, biochemical complexes), and **Nanochemistry** (nanoparticles, quantum dots). We will examine synthesis, chemical and physical properties, and characterization of each.



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CHEM 3346 meets T,R
9:30 AM—10:50 PM in
RBS 2015



Course Learning Outcomes

1. To understand and describe syntheses and properties of all major types of macromolecules and nanoparticles
2. To understand and describe supramolecular interactions in a variety of systems
3. To gain an working knowledge of analytical methods used to characterize macromolecules and nanoparticles
4. Gain an intuitive sense of polymers and plastics and their design

Textbook

No textbook will be used in this course

Some books, however, may serve as useful references:

M.M. Coleman and P.C. Painter, "Fundamentals of Polymer Science: An Introductory Text", 2nd Ed., Technomic Publishing/CRC Press LLC, Boca Raton, FL, 1997

C.S. Brazel and S.L. Rosen, "Fundamental Principles of Polymeric Materials", 3rd Ed., John Wiley and Sons, Inc., Hoboken, N.J., 2012

H.A. Wittcoff, B.E. Reuben and J.S. Plotkin, "Industrial Organic Chemicals", 3rd Ed., John Wiley and Sons, Inc., Hoboken, N.J., 2013

Steed, J.W.; Gale, P.A. "Supramolecular Chemistry: From Molecules to Nanomaterials"; Wiley and Sons: New York, 2012

Smith, D. K. "A Supramolecular Approach to Medicinal Chemistry: Medicine Beyond the Molecule," (2005) *J. Chem. Educ.* **82**, 393

Su, W.-F. "Principles of Polymer Design and Synthesis" Springer-Verlag Publishers, 2013

"The most fundamental difference between compounds of low molecular weight and macromolecular compounds resides in the fact that the latter may exhibit properties that cannot be deduced from a close examination of the low molecular weight materials. Not very different structures can be obtained from a few building blocks; but if 10,000 or 100,000 blocks are at hand, the most varied structures become possible, such as houses or halls, whose special structure cannot be predicted from the constructions that are possible with only a few building blocks."

-Hermann Staudinger (Nobel Laureate)

Course Grade

3 Midterm Examination	60%
10 Quizzes	20%
Final Examination	<u>20%</u>
	100%

Quizzes will be unannounced and may be in-class or take home.

The final examination will be comprehensive over the entire course.

Academic honesty will be expected in every aspect of the course.

Consider memorizing our UT Tyler honor code:

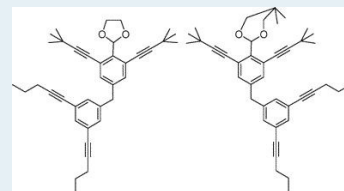
*I embrace honor and integrity. Therefore, I choose not to lie, cheat, or steal,
nor to accept the actions of those who do.*

Departmental Policy on Cell Phones and Electronic Devices During Examinations: *Cell phones and smart watches/electronic devices must be put away during exams. If they are observed out in a visually accessible place (i.e. between legs, on the floor, etc.), it will be assumed that they are being used to cheat and your exam will be taken, you will receive a zero score (0 points) for the exam, and you will be referred to the Office of Judicial Affairs.*

*“Nanotechnology is manufacturing
with atoms.”*

-William Powell

Synonyms for “plastic” include
“polymer”, “credit card”, and
“explosive”



**Census Date for the
Spring Semester
January 23, 2023**

Student Rights and Responsibilities

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>
UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar. Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract. The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

Student Rights and Responsibilities (continued . . .)

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

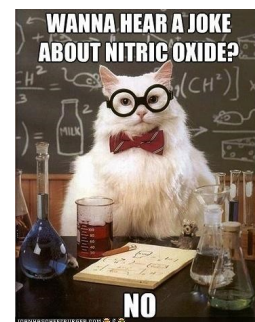
If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights & Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.



Student Rights and Responsibilities (continued . . .)

Faculty Office Hours: These are times when you can meet with your faculty to ask questions about the content, better understand the discipline, make career connections and more. Make use of office hours. Faculty list three hours a week (minimum) that they are available to you and also provide an appointment option if you have class or work during their office hours.

Writing Center: The Writing Center provides all undergraduate and graduate students a place to work on their writing projects and skills. There are tutoring options as well as workshops available to support you in your academic writing.

Math Learning Center: The Math Learning Center provides drop-in tutoring for lower-level math courses throughout the week. The MLC also has computer workstations for your use.

PASS Tutoring Center: The PASS Tutoring Center supports a variety of courses. Due to COVID-19, we are asking that you schedule an appointment for your face-to-face tutoring support. Tutoring is also available through Zoom tutoring sessions. Check the website to see the courses supported for the Fall 2021 term.

Supplemental Instruction (SI): SI is a series of weekly peer-assisted study sessions in courses identified by previous students as difficult. Due to COVID-19, SI sessions will be conducted face-to-face and via Zoom this fall. Check the website to see the support courses for the Fall 2021 term.

Upswing (24/7 Online Tutoring): Upswing is a free, confidential, and convenient way to receive help in nearly all of UT Tyler's undergraduate courses.

Robert R. Muntz Library Staff: UT Tyler has an incredible staff of librarians ready to assist you. Discipline/major library liaisons are available to support you and you can also schedule appointments for research consultations. In addition, the Robert R. Muntz library's Head of University Archives and Special Collections can assist you with scholarly communications, primary sources, and archive materials.

Canvas 101: This Canvas course provides you with a wealth of information – including how to navigate in Canvas, use ProctorU (and even take a practice test), tips for being a successful online and hybrid learner, how to use Zoom, and more!

Digital Support Toolkits: Digital Support Toolkits are supplemental materials generated by faculty to help you be successful in targeted courses typically taken by our freshman and sophomore population. Students registered in Digital Support Toolkits supported courses will find these in their Canvas dashboard. You don't have to register – just take advantage of this great resource.

UT Tyler Testing Center: The Testing Center provides securing testing opportunities to meet the needs of students and the community in an environment conducive to student and academic success.

Student Rights and Responsibilities (continued . . .)

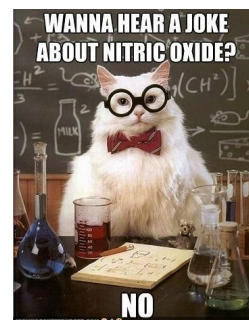
Student Accessibility and Resource (SAR) Office: The SAR Office works to provide students equal access to all educational, social, and co-curriculum programs through the coordination of services and reasonable accommodations, consultation, and advocacy.

Student Counseling Center: The Student Counseling Center supports students in developing balance, resiliency, and overall well-being both academically and personally. They have in person and virtual counseling options. In addition, the Student Counseling Center offers TAO, a self-help, completely private online library of behavioral health resources. Sign in to the TAO website using your UT Tyler credentials.

Important Covid-19 Information for Classrooms and Laboratories: Students are required to wear face masks covering their nose and mouth, and follow social distancing guidelines, at all times in public settings (including classrooms and laboratories), as specified by Procedures for Fall 2021 Return to Normal Operations. The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and should stay at home and may join the class remotely. Students who have difficulty adhering to the Covid-19 safety policies for health reasons are also encouraged to join the class remotely. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email saroffice@uttyler.edu.

Recording of Class Sessions: Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.



Date	Lecture Schedule	Resources
T 1/10/2023	Lecture 1 Introduction and General Synthetic Methods	PowerPoint 1.1
R 1/12/2023	Lecture 1 continued (Polymer step-growth polymerization)	1.2
T 1/17/2023	Lecture 1 continued (Polymer chain-growth polymerization)	1.3
R 1/19/2023	Lecture 1 continued (Nanoparticle preparation and structures)	1.4
T 1/24/2023	Lecture 1 continued (NP prep and struct cont'd) (<i>Census 1/23</i>)	1.5
R 1/26/2023	Lecture 1 continued (Quantum Dot <i>etc.</i> preparation)	1.6
T 1/31/2023	Lecture 2. Polymer Structure and Composition	2.1
R 2/2/2023	Lecture 2 continued (Morphology and Interactions)	2.2
T 2/7/2023	Lecture 2 continued	2.3
R 2/9/2023	Examination 1	
T 2/14/2023	Lecture 3. Isolation, purification, size-based separation techniques	3.1
R 2/16/2023	Lecture 3 continued	3.2
T 2/21/2023	Lecture 4. Macromolecule and mesoscale structure characterization	4.1
R 2/23/2023	Lecture 4 continued	4.2
T 2/28/2023	Lecture 4 continued	4.3
R 3/2/2023	Lecture 4 continued	4.4
T 3/7/2023	Lecture 4 continued	4.5
R 3/9/2023	Examination 2	
T 3/12-18/2023	<i>Spring Break</i> (whole week)	
T 3/21/2023	Lecture 5. Characterization of nanoparticles	5.1
R 3/23/2023	Lecture 6. Polymer and plastic classes: synthesis, structure, properties	6.1
T 3/28/2023	Lecture 6 continued (<i>Withdrawal date 3/23</i>)	6.2
R 3/30/2023	Lecture 6 continued	6.3
T 4/6/2023	Lecture 6 continued	6.4
R 4/6/2023	Lecture 7. Biopolymer structure, folding, stabilization & biosynthesis	7.1
T 4/11/2023	Lecture 7 continued	7.2
R 4/13/2023	Examination 3	
T 4/18/2023	Lecture 7 continued	7.3
R 4/20/2023	Lecture 7 continued	7.4
	Final Examination Thursday April 27, 2023 9:30 AM—11:30 AM	

