



MASC 110L: Materials Science

Units: 4

Term—Day—Time: Spring 2021, MWF 10:00-10:50 am

Location: Online

Instructor: Dr. Lessa Grunenfelder

Office Hours: Online, Friday 10-11 am or by appointment

Contact Info: grunenfe@usc.edu

Teaching Assistant (Lab): Dan Zebrine

Office Hours: Online, during scheduled lab periods

Contact Info: zebrine@usc.edu

Lab Technician: Shokry Bastorous

Contact info: bastorou@usc.edu

Teaching Assistant (Discussion): Yasaman Moradi

Office Hours: Online, during scheduled discussion periods

Contact Info: yasamanm@usc.edu

Course Description

MASC 110L is an introductory course intended for undergraduate engineering students. Key concepts in chemistry are discussed in the context of materials science and engineering application. The laboratory component of the course reinforces concepts covered in lecture through observation and experimentation. Topics include the electronic structure of atoms, elements and the periodic table, organic and inorganic compounds, chemical reactions, kinetics and thermodynamics, electrochemistry, and the structure and properties of engineering materials (metals, ceramics, polymers).

Learning Objectives

Following completion of this course, students should be able to

- Place concepts from chemistry and materials science into a broader historical context and describe the importance of the underlying science to engineering application
- Demonstrate familiarity with the organizational scheme of the periodic table, the electron structure of atoms, and the types and mechanisms of atomic bonding
- Describe and predict the structure of covalent and ionic compounds
- Interpret chemical formulas, Lewis structures, ball-and-stick models, space filling models, and line angle formulas
- Describe the difference (at the atomic/molecular level) between solids, liquids and gasses

- Classify engineering materials as metals, ceramics, or polymers, and describe the types of elements and atomic bonds characteristic of each material type
- Predict the behavior of gas phase chemical systems using ideal gas behavior
- Recognize an Arrhenius relationship, and interpret graphical information from processes that are described by an Arrhenius equation
- Use tabulated thermodynamic data to determine the spontaneity of a reaction
- Write and balance chemical equations
- Analyze experimental data, identify potential sources of experimental error, and relate concepts to simulation/experiment

A Blackboard website for the course (<http://blackboard.usc.edu>) will be used for general announcements, assignments, course emails, and important course documents and information. Be sure to check Blackboard and your USC email regularly.

Prerequisite(s): None

Co-Requisite(s): None

Course Notes

MASC 110L will utilize both asynchronous and synchronous online learning modes. Class will meet via Zoom three times per week. It is expected that students come to synchronous sessions having done assigned preparation (reading as well as tutorials/simulations/videos). Synchronous class time will be used for additional content delivery, questions and clarification, and working exercises.

The laboratory component of the course will be asynchronous. Students will collect and/or analyze data and submit lab reports each week.

Communication

Students can attend scheduled Zoom office hours or contact me any time via email (grunenfe@usc.edu). Email will be responded to within 48 hours (usually sooner).

Lab and Discussion Sections

The discussion TA will be available via Zoom during scheduled discussion sections to work example problems and answer student questions. You are encouraged but not required to attend discussion. You can attend either discussion section, not just the one you are registered for.

Similarly, the lab TA will be available via Zoom during all scheduled lab sections. You can attend any lab section(s) throughout the week, not just the one you are registered for, to ask questions and clarify any aspect of the week's lab activities or lab report.

The first lab section of the semester is mandatory, and you must attend the lab section you are registered for. This meeting will consist of TA and student introductions, an overview of lab report expectations, and an introduction to the online lab format.

Technological Proficiency and Hardware/Software Required

All course content will be delivered via Blackboard and Zoom. For technical issues with Blackboard email blackboard@usc.edu and for Zoom issues contact the ITS Customer Support Center at consult@usc.edu

USC technology rental program

Attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please [submit an application](#).

USC Technology Support Links

[Zoom information for students](#)

[Blackboard help for students](#)

[Software available to USC Campus](#)

Required Materials

Text: Chemistry: Principles and Reactions, Masterton and Hurley, 8th edition

ISBN: 9781305079373

A physical copy of the textbook is *not* required for the class. Purchase a hard copy only if you want one. An electronic version of the text will be available through Blackboard, and students are responsible only for material covered in lecture and discussion sections. Hard copies of the book come with an OWL access code (see below) – do not misplace this code.

Online web-based learning (OWLv2)

A web-based system will be used for pre-class preparation, readings, practice problems, and quizzes. *Online access to the OWL system (which includes an electronic copy of the textbook) is required.* Register by clicking the “MASC 110L Spring 2021” link at the top of the Content section in the course Blackboard site. The first time you click through you will be guided through a series of prompts to register for access this semester.

Use your USC email and the name that you are registered under at USC when signing up.

Need help? Visit [cengage.com/start-strong](https://www.cengage.com/start-strong) for step-by-step registration instructions and videos. When prompted select **OWLv2**, **Blackboard**, and **No**.

Description and Assessment of Assignments

Pre-Class preparation

Each week, on Friday, readings and preparatory materials (simulations, tutorials, lecture videos etc.) will be posted to Blackboard. Readings are not graded but will help prepare you for pre-class and in-class activities. All graded preparatory materials must be completed and submitted prior to the start of class on Monday. When Monday is a holiday or wellness day, due dates are shifted to Wednesday at 11 am.

Daily practice problems

Following each class, OWL practice problems will be posted. These problems are not graded but will prepare you for quizzes. Practice problems allow multiple attempts and include access to feedback and explanations.

In-Class activities

Synchronous Zoom sessions will involve lecture as well as individual and occasional group work. You are expected to participate in breakout room and full class discussions. Each class will include Zoom polls and sometimes comments in the chat box, and/or speaking over microphone. If you are unable to attend a synchronous Zoom session, you can receive credit for class participation by watching the posted recording and completing any polls/activities and submitting to me via email. *You must also complete and submit the assigned practice problems for any missed lecture day(s).*

Quizzes

Six timed quizzes will occur throughout the semester on main course topics. These quizzes will consist of question types pulled from the daily practice problem sets. Quizzes will be assigned on Wednesdays. Quizzes can be taken at any time on the day they are assigned but are limited to one 1 hr attempt. Quizzes are open resource (notes/internet) but must be completed individually (no consultation with other students or anyone else). One attempt is allowed for each quiz question, and hints/feedback are disabled. Handwritten work must be scanned and submitted immediately following quiz submission. Quizzes will be auto graded for correctness only, but quiz

scores will be manually adjusted to provide partial credit based on handwritten work submitted. If work is not submitted the quiz score will be 0. Your quiz score for the semester will consist of your top 5 quiz grades (lowest quiz score is dropped).

Lab reports

Labs will take place asynchronously. Lab instructions will be made available to all students at the start of each week (Monday, 11 am). Lab reports are due prior to the start of class the following Monday. When Monday is a holiday or wellness day, due dates are shifted to Wednesday at 11 am. Lab data sheets must be submitted with each lab report. At the end of the semester your lower lab report score will be dropped.

Summary sheets

Prior to each quiz you will create and submit a summary sheet detailing the relevant section of the course in pictorial form. These summary sheets (concept maps) should be visual rather than text based, using a flowchart format or similar approach to synthesize information. Creating each summary sheet, which requires deep conceptual learning, will be a useful tool in preparing for quizzes and creating lasting knowledge of course content. It will also allow me to track your learning and address any misconceptions. In addition to creating your own summary sheets, you will provide feedback on other students' sheets. Summary sheets can be electronically generated, or hand drawn and scanned, but must be submitted as pdf files. Summary sheets are due the Monday preceding each quiz, prior to the start of class (11 am).

Final project

In lieu of a final exam you will create a poster presentation to communicate the main ideas of a course topic of interest to you. Any course learning objective can be adapted into a project topic. You will create a poster (using PowerPoint, making a physical poster with paper and pen and photographing, etc.) and accompanying 5 min presentation video. Your poster and presentation should introduce your chosen topic, give concise definitions of key terms, present any relevant equations, describe any data that might be collected in a lab to illustrate the concept, and explain why the topic is important to the world outside of a chemistry class (specifically the engineering relevance). Your presentation must be accompanied by a bibliography of academic sources.

Projects will be graded on accuracy, relevancy, presentation, references, and style. You will submit a draft for peer feedback and provide feedback to other students.

Grading Breakdown

Assignment	% of Grade
Pre-class activities	10
In-class activities (or makeup assignment)	5
Quizzes	30
Lab reports	30
Summary sheets	10
Final project	15
Total	100

Grading Scale

Course final grades will be determined using the following scale.

Numerical Score	Letter Grade
90-100	A
87-90	A-
84-87	B+
82-84	B
80-82	B-
78-80	C+

Numerical Score	Letter Grade
74-78	C
70-74	C-
65-70	D+
60-65	D
55-60	D-
0-55	F

Assignment Submission

All course assignments will be distributed and submitted via Blackboard (OWLv2 material redirects to an external site but is fully integrated with the Blackboard grade book).

Grading Timeline

OWLv2 assignments are graded instantaneously upon submission. Other assignments will be graded within a week of submission. Students can access feedback on lab reports and summary sheets via Blackboard, OWLv2 practice problems have integrated feedback and explanations.

Late work

Lab reports for each experiment are due the following week, prior to the start of class (typically Monday 11 am). Reports submitted up to one week late receive 75% credit, and those submitted up to two weeks late receive 50% credit. No credit is given for lab reports submitted more than two weeks late. Your lab grade will be based on 9 lab reports. There is a final 10th lab, assigned the last week of the semester, that is optional. You can complete the 10th lab to replace a low or missed lab report grade.

Deadlines for summary sheets and quizzes are firm. For final project submissions a late penalty of 10% will be applied immediately following the due date, with an additional 15% deduction every 12 hours thereafter.

Throughout the semester students will be granted 2 no-questions-asked extensions on any lab report. Extensions will move the due date from Monday at 11am to Friday, end of day (11:59 pm)

Academic integrity

Students are welcome to discuss lab reports and practice problems with peers and TAs. All submitted work, however, must be the student's own. Any information taken from sources must be cited – proper citation format for lab reports and the final project will be discussed. Summary sheets should be completed individually and represent each student's unique thought process and perspective. Quizzes are open resource (notes/internet) but must be completed individually (without consultation with peers, TAs, or anyone else).

Attendance

Attendance at MWF synchronous Zoom lecture sessions is encouraged, but not required. When it is necessary for a student to miss a synchronous session credit for in-class activities can be earned by watching the posted recording and completing and submitting the following, within one week of the missed class:

- All practice problems assigned that day – submit via OWL
- Answers to any in-class polls
- Write-ups for any in-class activities.

Lab sessions and discussion sessions are optional. Discussion session time slots will serve as TA office hours. The discussion TA will work example problems based on weekly assigned practice problems and answer any student questions about course material. Lab sessions, similarly, will be a chance for students to discuss lab assignments and lab reports with the lab TA. Students are welcome to attend any discussion or lab section(s), not just the one they are registered for.

Netiquette

"Netiquette" or "internet etiquette," describes recommended behaviors for online communication.

- Students can log in to synchronous sessions using a computer, tablet, or phone
- Students should update their display name in Zoom to reflect how they would like to be addressed by the instructor and peers
- Students should mute themselves when not speaking
- Students are encouraged, though not required, to turn on their webcams while in breakout rooms and while participating in discussions. If a camera is not available, or cannot be turned on, students should upload a profile photo to their Zoom account.
- Students are encouraged to unmute to ask questions at any time during synchronous sessions, and/or use the raise hand and chat features in Zoom.
- Students can eat, drink, and leave for bathroom breaks at any time during synchronous sessions
- Chat acronyms, emoticons, etc. are permitted in chat and on discussion boards

Please contact me with any questions about class policies or any issues with conduct in Zoom sessions or other online interactions.

Synchronous session recording notice

Synchronous sessions will be recorded and made available to students via Blackboard. Transcripts of the chat will also be archived and made available to students. Breakout room discussions will not be recorded.

Sharing of course materials outside of the learning environment

Per university policy, recordings of synchronous sessions as well as all asynchronous course materials (notes, assignments, etc.) cannot be shared outside of the MASC 310 learning environment.

SCampus Section 11.12(B)

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).

Course evaluation

Course evaluation occurs at the end of the semester university-wide. The learning experience evaluation is a critical tool for instructors and the university to improve teaching. Students are asked to provide honest and constructive feedback and focus on specific aspects of instruction as opposed to personal characteristics of the instructor. In addition to the end of course evaluations, students will be provided with weekly opportunities for feedback and course reflection as part of each homework assignment.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Lab Topic	Assigned	Due
Syllabus Day	Introduction to course, syllabus review	NO LAB	Week 1 prep	
Week 1 (No class 1/18)	Classification of matter	Lab report preparation and grading	Lab 0 Week 2 prep	Week 1 prep
Week 2	Atoms, molecules and ions	Determination of Avogadro's number via electrodeposition	Lab 1 Week 3 prep	Week 2 prep Lab 0
Week 3	Electronic structure and the periodic table	Atomic Spectroscopy	Lab 2 Week 4 prep Summary Sheet 1	Week 3 prep Lab 1
Week 4	Metallic and ionic bonding Crystals: structures of metals and ceramics	Crystals: structures of metals and ceramics	Lab 3 QUIZ 1 Week 5 prep	Week 4 prep Summary sheet 1 Lab 2 QUIZ 1
Week 5 (No class 2/15)	Covalent bonding: Lewis structures	NO LAB	Week 6 prep	Week 5 prep Lab 3
Week 6	Exceptions to the octet rule and VSEPR Hydrocarbons	Molecular shape	Lab 4 Week 7 prep Summary sheet 2	Week 6 prep
Week 7	Organic compounds	Functional groups and chemical tests	Lab 5 QUIZ 2 Week 8 prep Summary sheet 3	Week 7 prep Lab 4 Summary sheet 2 QUIZ 2
Week 8 (No class 3/12)	Polymer structures	Mechanical properties of materials	Lab 6 QUIZ 3 Week 9 prep	Week 8 prep Lab 5 Summary sheet 3 QUIZ 3
Week 9	Gasses and liquids	Kinetic molecular theory	Lab 7 Summary sheet 4 Week 10 prep	Week 9 prep Lab 6
Week 10	Kinetics	NO LAB	Week 11 prep QUIZ 4	Week 10 prep Lab 7 Summary sheet 4 QUIZ 4
Week 11	Equilibrium	Kinetics and equilibrium	Lab 8 Week 12 prep Summary sheet 5	Week 11 prep
Week 12 (No class 4/7)	Thermodynamics	NO LAB	Week 13 prep QUIZ 5	Week 12 prep Lab 8 Summary sheet 5 QUIZ 5
Week 13	Thermochemistry	Calorimetry	Lab 9 Summary sheet 6 Week 14 prep	Week 13 prep
Week 14	Redox reactions	Acids, bases, and electrochemistry	Lab 10 QUIZ 6 Week 15 prep	Week 14 prep Lab 9 Summary sheet 6 QUIZ 6
Week 15 (No class 4/30)	Electrochemistry	NO LAB	Final project	Week 15 prep Lab 10
FINAL	Final draft due by 11 am Wednesday, May 5 – see Blackboard for additional details			

Diversity Statement

I am committed to creating an inclusive environment in which all students are respected and valued. I will not tolerate disrespectful language or behavior on the basis of age, ability, color/ethnicity/race, gender identity/expression, marital/parental status, military/veteran's status, national origin, political affiliation, religious/spiritual beliefs, sex, sexual orientation, socioeconomic status or other visible or non-visible differences. I expect the same from you.

You are here to learn the course content, and I am here to teach it, but we are all here to grow as people and learn from one another. It is each of our responsibility to ensure that our online classroom space, and the university, is a safe and inclusive environment that facilitates learning.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

