CHEM 410– Review of Chemistry Fundamentals – FALL 2026

1. COURSE SECTION

Section	1
CRN	17383
Class day/time	W 4:00 – 5:15pm
Location	FB 103

2. INSTRUCTORS' INFORMATION

Instructor	Address	Office	Email	Phone
Dr. Sundeep Rayat	Department of Chemistry Ball State University Muncie, IN	FB 502	srayat@bsu.edu	765-285-8308
Dr. Nicole Christofield		FB 306	nrchristofie@bsu.edu	765-285-8060
Dr. Jason Ribblett		FB 314	jwribblett@bsu.edu	765-285-8074
Dr. Wei Shi		FB 504	wqshi@bsu.edu	765-285-2194
Dr. Emil Khisamutdinov		FB 309	kemil@bsu.edu	765-285-8084

3. COURSE INFORMATION

3.1 COURSE DESCRIPTION

CHEM 410 is a senior level undergraduate capstone course which reviews fundamental chemistry concepts in the areas of physical, organic, inorganic, analytical, and biochemistry and develops critical thinking skills. The focus will be placed on reviewing this material and by practicing multiple choice questions to prepare the students for objective tests such as the ETS Major Field Test in Chemistry and the Graduate Record Exam in Chemistry.

3.2 PREREQUISITES

CHEM 225

Co-requisite: CHEM 444 or CHEM 445. This course is required for chemistry majors.

3.3 COURSE OBJECTIVES

CHEM 410 will develop our students' critical thinking skills and will better prepare them for national standardized exams which will allow for acceptance into stronger graduate programs and better financial aid packages. These skills will also prepare our students for qualifying exams and cumulative exams which are a component of most graduate programs. In addition, this course will validate that our majors are learning the necessary fundamental skills they should have upon completion of a bachelor's degree in chemistry. Finally, this course will provide the department with data which will allow for assessment of the chemistry program to ensure that our students are sufficiently prepared for graduate school or work in the chemical sciences.

First, the course will review rudimentary concepts which some majors may not have seen since their 200 level chemistry courses. Second, this required course for chemistry majors will hold the students accountable for their scores on the department approved exit exam (post-exam) which will serve as the final exam in the course. Third, this course will focus on practicing multiple choice and other objective type questions similar to those on standardized exams. The style of many exams in other chemistry courses generally contain few objective questions and focus more on essay and short answer styled problems.

3.4 COURSE CONTENT

The course will cover fundamental topics from each division of chemistry encompassing General Chemistry, Organic Chemistry, Biochemistry and Spectroscopy.

3.5 COURSE SCHEDULE

Week	Date	Instructor/Content
1	August 26	Rayat – Pre-exam
2	September 2	Christofield – CHEM 111
3	September 9	Ribblett – CHEM 112
4	September 16	Shi – CHEM 231
5	September 23	Rayat – CHEM 232
6	September 30	Rayat – CHEM 232
7	October 7	Khisamutdinov – Biochemistry
8	October 14	Shi – Spectroscopy
9	October 28	Shi – Post-exam

4. COURSE MATERIALS

In lieu of a formal assigned textbook, assigned readings and other materials will be provided by the instructor(s). All textbooks used for previous courses in the chemistry curriculum will be useful auxiliary resources.

5. COURSE ASSIGNMENTS

Week 1: Students will be given a 60-minute multiple choice pre-exam.
Week 2: Students will be given results of pre-exam. Professor will review CHEM 111 (of most need, based on exam scores). Homework will be given (primarily objective style questions) and is due by the following Monday by 4:59 PM.
Week 3-8: Repeat of Week 2 process with new topic. Graded homework returned and new homework given.
Week 9: Students will be given a 60-minute multiple choice post-exam which will serve as the final examination.

Homework will be submitted electronically or on paper as instructed by individual professors. Instructions to properly scan your work into a pdf file for submission is available on Canvas page.

6. COURSE ASSESSMENT

Pre-Exam	0 – 150 points.	Points awarded according to percentile.
Homework	7 x 100 points each = 700 pts	
Attendance/Participation	7 x 50 points each = 350 pts	
Post-Exam	0 – 300 points	Points awarded according to percentile.
Total points available	**1500**	

Percentile Table:

Exam Percentile	Percent of Points Awarded
At or above 80th	100%
⋮	⋮
50th	70%
⋮	⋮
At or below 10th	40%

The approximate cut-off ranges for letter grade are as follows:

		A	≥ 92.0%	A-	≥ 90.0%
B+	≥ 87.0%	B	≥ 82.0%	B-	≥ 80.0%
C+	≥ 77.0%	C	≥ 72.0%	C-	≥ 70.0%
D+	≥ 67.0%	D	≥ 62.0%	D-	≥ 60.0%
		F	< 60%		

7. UNIVERSITY POLICIES AND STANDARDS

7.1 UNIVERSITY STATEMENT

We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse.

7.2 DISABILITY STATEMENT

If you need course adaptations or accommodations because of a disability, please contact the instructor of record as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or dsd@bsu.edu.

7.3 FREEDOM OF EXPRESSION

In this course, we are committed to fostering a learning environment that values intellectual diversity, encourages free expression, and promotes open inquiry. As members of the Ball State Community, we treat each person in the Ball State community with civility, courtesy, compassion, and dignity and respect and learn from differences in people, ideas, and opinions. Please review Ball State University's Statement on Freedom of Expression, the resources on Ball State's Freedom of Expression webpage, and Ball State's Beneficence Pledge.

In the context of this class, **Freedom of expression** means being able to ask questions, offer ideas, propose new hypotheses or engage in open discussions without judgment. It encourages a healthy learning environment where we grow by experimenting—both in lab and in thought. This freedom fuels innovation and scientific discovery. While chemistry is grounded in fundamental principles, anomalies and unexpected results do occur. Scientists must feel free to explore and publish unconventional ideas if they are supported by **evidence-based research**. Scientific knowledge evolves through debate, experimentation, and replication. Therefore, in chemistry, it is not just about expressing an idea—it is about backing it with data, peer-reviewed studies and logical reasoning. Feel free to search the scientific literature to explore different viewpoints, verify results or expand your own understanding of concepts/techniques covered in this course.

7.4 ATTENDANCE

Regular attendance is mandatory. Notify your instructor in advance if you must miss a class. Accommodations for student absences will be made according to the university polices as listed here. If you are forced to miss a lab session due to a family emergency, serious illness, BSU activity or other unforeseen circumstances, you must inform your instructor in advance *via* email or as soon as possible after the absence begins. You may need to provide documentation (with confidential information redacted when appropriate) if requested. Work with your instructor to make-up the missed assignments. Due dates may be extended in case of excused absences.

8. STUDENT SUPPORT SERVICES

Students can benefit from free tutoring and coaching at the Learning Center, mental health assistance at the Counseling Center, and assistance with basic needs at the Basic Needs Hub.

9. CANVAS AND STUDENT PRIVACY

9.1 CANVAS ACCESSIBILITY

Canvas provides a user experience that is easy, simple, and intuitive. Special attention has been paid to making Canvas screen-readable. The Rich Content Editor encourages users to create accessible content pages (i.e. text formatting is accomplished using styles). Canvas is designed to allow limited customization of colors and schemes to be accessible for all users. The National Federation of the Blind granted Canvas the Gold Level Web Certification in 2010. Find more information by visiting the Canvas Voluntary Product Accessibility Template (VPAT).

9.2 FERPA AND PRIVACY

As a student, your educational records are considered confidential. Under FERPA (Family Educational Rights and Privacy Act), your records are confidential and protected. Under most circumstances, your records will not be released without your written and signed consent. However, some directory information may be released to third parties without your prior consent unless a written request to restrict this is on file. You can learn more about student rights to privacy by reading Ball State's FERPA and Privacy and Protection.

10. COURSE EXPECTATIONS AND POLICIES

10.1 COURSE PARTICIPATION EXPECTATIONS

- Make sure you have an on-time arrival and your complete attention in class.
- Complete all assignments by the stated due dates by the instructor.

10.2 FEEDBACK POLICY

- Your instructor will respond to your email within 24 hours during weekdays (Monday-Friday) and within 48 hours on the weekend (barring unforeseen circumstances).
- Your instructor will typically provide feedback on assignments within 5 school days of submission (barring unforeseen circumstances).
- Contact your instructor directly if you have questions or concerns about your performance in the assignment or course.

10.3 LATE ASSIGNMENT POLICY

- All assignments are due by 4:59 pm EST/EDT time on the due dates indicated.
- Assignments submitted after the posted due date will be subject to a 10% deduction from the assignment grade for each calendar day they are late. After 4 calendar days, the assignment will no longer be accepted and will receive a score of 0. Example: An assignment that earns 90/100 points but is submitted 1 calendar day late will receive 81/100 points (a 10% deduction). If the same assignment is submitted 2 calendar days late, it will receive 72/100 points (a 20% deduction). If it is submitted 3 calendar days late, it will receive 63/100 points (a 30% deduction) and so forth. Assignments submitted more than 4 calendar days after the due date will not be accepted.
- Late assignments are only permitted under extenuating circumstances without penalty as determined by your instructor.

11 SUBJECT TO CHANGE STATEMENT

This syllabus is subject to change in the event of extenuating circumstances.