

Course Description

This course is designed to give you both practical operational experience on modern analytical instruments and a complete understanding of the principles of operation and limits of the instrumentation. It includes about 2 hours in-person lecture and 4 hours of in-person laboratory work each week. In the lectures you will learn the chemical or physical principles exploited during the measurement, how the instrument actually makes the measurement and some of the techniques used to increase accuracy, precision and sensitivity. In the laboratory, you will put this knowledge into practice by performing various experiments designed to provide examples of the usefulness of the particular instrument or technique.

The course also includes asynchronous online components such as graded discussion boards, which will take place in Blackboard. Your participation in graded learning activities is required. If you need help with Blackboard or other technology required for the course, please email: helpdesk@csi.cuny.edu or visit [CSI help desk](#).

Time & Location

| | | |
|----------|-------------------|--------|
| Lecture: | Tue 8:00-9:55 AM | 6S-232 |
| Lab: | Tue 10:10-2:15 PM | 6S-249 |

Instructor: Dr. Shi Jin

Office: 6S-234 *Phone:* 718-982-3890 *Fax:* 718-982-3910

Email: shi.jin@csi.cuny.edu

Text: *Principles of Instrumental Analysis 6th Ed. by Skoog/Holler/Crouch,*
Thomson Learning – Brooks/Cole ISBN-10: 0-495-01201-7

Office Hours: 10:00-10:59 am Monday and Wednesdays in-person at 6S-234 and 8:00-8:59 PM EDT/EST Sunday (virtually). You can visit my virtual office by clicking on “Shi Jin’s virtual office” link on our course main menu.

All questions are welcome. If you are sending me multiple pictures via email, please rotate them accordingly and put them in the intended order into a single Adobe pdf or Microsoft PowerPoint file so that I can directly read the content without rotation. Your email will be addressed within **one business day** (usually much sooner). Note that if your email is purely about course materials, I may address in the form of an announcement or during a lecture (to benefit all students), please don’t feel disappointed for not directly receiving responses from me.

Learning Objectives

- The student will learn and understand the role of instrumentation in the modern analytical chemistry laboratory.
- The student will learn and understand the principles of operation and the major building blocks of modern chemical instruments.
- The student will learn to evaluate the performance of instruments in terms of their strengths and shortcomings in chemical analysis and make a good choice of instrumentation for a particular analytical purpose.
- The student will learn how to optimize, calibrate, and utilize chemical instruments for problem solving.

- The student will learn how to communicate in writing and reporting the results of an investigation.

Course Points:

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|----------------------------|----------------|
| Middle-term Exam: | 12 pts |
| Quizzes: | 10 pts |
| Final Exam: | 22.5 pts |
| Discussions (online): | 15 pts |
| Homework: | 5 pts |
| Signature page submission: | 0.5 pts |
| Special project | 10 pts |
| Lab: | 25 pts |
| Total: | 100 pts |

Letter Grade Assignment:

Letter grades will be assigned based on your overall course score (rounded to a whole number) according to the following cutlines:

| Course score | Letter Grade | Course Score | Letter Grade |
|--------------|--------------|--------------|--------------|
| 90+ | A | 65-69 | C+ |
| 85-89 | A- | 60-64 | C |
| 80-84 | B+ | 55-59 | D |
| 75-79 | B | 0-54 | F |
| 70-74 | B- | | |

Exams and quizzes

There will be **one** middle-term exam given during the regular class hours. The exam counts 12% of the course grade. There will be one short quiz every time the class meets, except the first class and the day when an exam is given. The quizzes count 10% of the course grade.

No makeup exams or quizzes will be given.

The final exam covers the entire semester's work and counts 22.5% of the course grade.

No scores will be given out by telephone or by e-mail. You can find your score by logging in Blackboard or stopping by my office during office hours to get your score.

Forums (15%)

Forums can be accessed by clicking on “discussions”. A discussion forum will be setup for each unit. Each student is required to respond to at least once to an initial discussion prompt and reply in a substantive post to at least one other participant for EACH UNIT before the deadline. The grades will depend on the quality of posts.

There will be a Q&A forum for students to ask and answer questions. Those posts will not be graded.

Special Project

Each student need choose one topic from different instrumental topics such as GC, HPLC, UV, Fluorescence, NMR, FT-IR, Mass Spectroscopy, GPC and Thermal Analysis (TGA/DSC).

By week 10-submit a summary of plan and literature search

By week 14-final presentation to the class. Each student has 30 minutes. The students who are not presenting must ask questions and evaluate the presentation.

Homework

Turning in of the homework is required when the exam of the corresponding chapters is given. It will be recorded and count 5% of the lecture grade. However, each individual homework assignment will not be graded. **Late homework will not be accepted.**

Attendance Policy

A student who is absent in excess of **2** times in the semester without eligible reasons will be assigned a grade of WU (withdraw unofficially).

Academic Honesty

You must work independently on your quiz or exam. Students who receive or give any help during a quiz or examination are considered cheating and will automatically receive **a grade of F for this course.**

Online Materials: All material presented will be available on Blackboard ASAP. Course relevant notifications, assignments, etc. will also be posted online and may be downloaded.

Course Withdraw Policy:

Tuesday, December 13th 2022 is the last day a student can drop themselves from a class in CUNYfirst with a grade of W.

Center for Student Accessibility:

If you believe that you have a disability requiring an accommodation, please contact the Center for Student Accessibility at 718-982-2510 or visit the Center in 1P-101. You can also check out their website at www.csi.cuny.edu/csa/. You must notify your instructor at the beginning of the semester.

Course Syllabus:

The following is a tentative outline for **CHM 340**. You are strongly advised to read the corresponding chapter in the textbook before attending the lecture. It is very important to get a good start and not fall behind.

| Date | Topic | Reading |
|-------------|--|----------------|
| Aug. 30 | Introduction, Signal-Noise | Chapter 1, 5 |
| Sep. 6 | Thermal methods | Chapter 31 |
| Sep. 13 | UV-Visible absorption spectroscopy | Chapter 6, 13 |
| Sep. 20 | UV-visible and fluorescence spectroscopy | Chapter 14, 15 |
| Oct. 11 | FT-IR spectroscopy | Chapter 7I, 16 |
| Oct. 18 | FT-IR/Raman Spectroscopy | Chapter 17, 18 |
| Oct. 25 | Nuclear Magnetic Resonance Spectroscopy | Chapter 19 |
| Nov. 1 | Nuclear Magnetic Resonance Spectroscopy | Chapter 19 |
| Nov. 8 | Mid-term Exam | |
| Nov. 15 | Introduction to Chromatography | Chapter 26 |
| Nov. 22 | Gas Chromatography | Chapter 26, 27 |
| Nov. 29 | Liquid Chromatography | Chapter 28 |
| Dec. 6 | Mass spectrometry | Chapter 20 |
| Dec. 13 | Special project presentation | |

NOTE:

Not every chapter of the book will be covered to the same extent. Certain topics will be emphasized, others will not be discussed or just briefly.

Homework Assignment for CHM 340

It is essential that homework assignments are done conscientiously since they contribute greatly to an understanding of the course material. It is better to do the homework problems by writing them out in detail than scanning them all superficially

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|---------|--|
| Chap 1 | 1, 6, 9, 11 |
| Chap 5 | 1, 3, 7, 10, 12 |
| Chap 6 | 1 (a-c, e, f, g, h, i, l-p), 3, 5, 7, 11, 14, 17, 18 |
| Chap 13 | 5, 7, 10, 13 (b, f, g), 16, 18, 23 |
| Chap 14 | 1, 2, 8 |
| Chap 15 | 1, 2 (a, b, d, e, f, g, h, i, l), 3, 4, 5, 7, 13 |
| Chap 16 | 1 (b); 3; 4; 6; 8; 10; 13 |
| Chap 17 | 1, 2 |
| Chap 18 | 2, 3, 8 |
| Chap 19 | 3, 4, 9, 19, 24, 27, 29, 31, 32, 35 |
| Chap 20 | 1, 2, 3, 12 |
| Chap 26 | 1, 2, 6, 7, 11, 14, 15 |
| Chap 27 | 1, 3, 9, 11, 17, 25 |
| Chap 28 | 3, 4, 5, 7 (a, b, d, e, h, i), 8, 11, 14 |
| Chap 31 | 1 (a, b, c), 3, 4, 6, 7, 11 |

Student's Agreement

I have read the syllabus for CHM 340 Fall 2022 and I agree to abide by all policies and requirements stated in the syllabus.

Print Name: _____

Signature: _____

Date: _____