

Math 323, Section 2, Formal Mathematical Reasoning and Writing

MWF 1:00pm–1:50pm, in Psychology, Rm 205

Instructor: Moysey Brio

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Office Hours: M 2pm-3pm, F 10am-11am (in ENR2 room s407)
W 11am-noon (in Upper Division Tutoring Room, *Math 220*)

Enrollment Requirements: ((Math 313 or 215) and (C or higher in (Math 243 or Math 315 or CSC 245 or CSC 144))); OR C or higher in (Math 313 or Math 215) OR, Math Milestone level 8. Concurrent enrollment in Math 396L required if (Math 215 or (C or D in Math 313)).

Required Text: Richard Hammack, “*Book of Proof*”, 2018 (see online or on d2l).

Additional Resources: Provided on d2l, also available free online or through the library:

1. Clive Newstead, “*An Infinite Descent into Pure Mathematics*”, 2022, <https://infinitedescent.xyz>
 2. Daniel W. Cunningham, “*A Logical Introduction to Proof*”, Springer, 2012
 3. Steven G. Krantz, “*Transition to Analysis with Proof*”, CRC Press, 2018
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Equipment and software requirements: For this class you will need daily access to the following hardware: web access and ability to run web browser, computer and Adobe Acrobat or any other format suitable for d2l and the Gradescope upload.

Course description: Elementary real analysis as an introduction to abstract mathematics and the use of mathematical language. Elementary logic and quantifiers; manipulations with sets, relations and functions, including images and pre-images; properties of the real numbers; supreme and infimum; other topics selected from cardinality, the topology of the real line, sequence and limits of sequences and functions; the emphasis throughout is on proving theorems.

Course objectives:

1. Students will learn how to state and solve problems in a precise mathematical way.
2. Students will learn mathematical proof techniques including direct proofs, proof by contradiction, and mathematical induction.

Expected Learning Outcomes

By the end of the course, students should be able to:

1. identify valid and invalid logical arguments
2. create valid proofs (or disproofs) of mathematical propositions
3. recognize and use set notation to describe sets
4. represent relations using graphs, matrices, and sets
5. identify properties of a given relation
6. construct proof based on the properties of real numbers; supremum and infimum;
7. apply definitions and proofs for selected topics from real analysis and topology of the real line.

Tentative Class Schedule:

Week	Monday	Wednesday	Friday
1		Sections 1.1, 1.2	Section 1.1
2	No class	Sections 1.5, 1.6, 1.7	Section 1.8
3	Section 1.2	Sections 1.3, 1.4	Sections 2.1, 2.2
4	Sections 2.3, 2.4	Section 2.5, 2.6	Sections 2.7, 2.9
5	Sections 2.10, 2.12	Review	Exam I
6	Sections 4.1, 4.2, 4.3	Sections 4.3, 4.4	Sections 5.1, 5.2
7	Section 6.1	Sections 6.2	Section 1.1 Section 1.2
8	Sections 7.1, 7.3, 7.4	Sections 8.1, 8.2	Section 8.3
9	Section 8.4	Sections 9.1, 9.2	Section 10.1
10	Sections 10.1	Section 10.2, 10.3	Review
11	Exam II	Section 11.1, 11.2	Sections 11.3, 11.4
12	Sections 11.5, 11.6	Section 12.1	Section 12.2
13	Section 12.2	Section 12.5	Sections 12.5
14	Sections 13.1, 13.2	Sections 13.4, 13.6	Sections 14.1, 14.2
15	Section 14.3	Review	Exam III
16	Review	Review	
17	Final Exam		

Homework: Regular weekly homework assignments should be turned in as a hard copy (no emails will be accepted) by the end of the class on the date it is due. ***Late homework will not be graded.*** Two lowest scores will be dropped. The practice problems do not have to be turned in, but are an essential part of the preparation for the quizzes and the exams. The work should be *an individual work*, but the students are encouraged to consult between themselves and the instructor. Each homework assignment will be equally weighted, but the individual problems within each assignment may not be equally weighted.

Quizzes: There will be weekly quizzes the next class after the homework is turned in. The three lowest scores will be dropped.

Three midterm closed book exams will be given with tentative dates Feb. 9, Mar. 18, and Apr. 24. Any questions regarding the grading of exams need to be addressed within one week after the exam has been graded.

Final Exam: Monday, May 6, 1:00pm-3:00pm, in our regular classroom, Psychology, Rm 205.

The use of all electronics such as laptops, iPads, cell phones, iWatches, etc. during the quizzes and exams is strictly prohibited and must be stowed away.

Grading:

- Homework:	20 points
- Quizzes:	15 points
- Three Midterm Exams:	45 points (15 points for each exam)
- Final Exam:	20 points

Total:	100 points

The numerical scores will be converted to letter grades at the end of the semester. Scores of 60, 70, 80, and 90 points will guarantee grades of D, C, B, and A, respectively. The actual cutoff points will depend on the general performance of the class.

Missed Exams: Missed midterm exam must be justified in writing before the exam and must be approved by the instructor. The score for the justified missed midterm exam will be computed as an average between the other two midterm exams and the 3/4 of the final exam scores. If the absence for the midterm is not approved, zero score for the missed exam will be given. A missed final exam will result in a grade of I or E.

Make-Up Policy: *There will be no make-up for missed quizzes or midterm exams.*

Missed classes: It is the student's responsibility to keep informed of any announcements, syllabus adjustments, material covered or policy changes made during scheduled classes.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>. *In particular, CHEATING will automatically result in the course grade E.*

Dates and Deadlines Calendar: <https://registrar.arizona.edu/dates-and-deadlines>

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Absence and Class Participation Policy

- The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>
- The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.
- Absences preapproved by the UA Dean of Students (or dean's designee) will be honored. See <http://policy.arizona.edu/employmenthuman-resources/attendance>.

Classroom attendance:

- If you feel sick, or if you need to isolate or quarantine based on [University protocols](#), stay home. Except for seeking medical care, avoid contact with others and do not travel.
 - Notify your instructor(s) if you will be missing a course meeting or an assignment deadline.
 - Non-attendance for any reason does **not** guarantee an automatic extension of due date or rescheduling of examinations/assessments.
 - Please communicate and coordinate any request directly with your instructor.
 - If you must miss the equivalent of more than one week of class, please contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.
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- **Academic advising:** If you have questions about your academic progress this semester, please reach out to your academic advisor (<https://advising.arizona.edu/advisors/major>). Contact the Advising Resource Center (<https://advising.arizona.edu/>) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@arizona.edu.
 - **Life challenges:** If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The [Dean of Students Office](#) can be reached at (520) 621-2057 or DOS-deanofstudents@email.arizona.edu.

- **Physical and mental-health challenges:** If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Safety on Campus and in the Classroom

For a list of emergency procedures for all types of incidents, please visit the website of the Critical Incident Response Team (CIRT): <https://cirt.arizona.edu/case-emergency/overview>

Also watch the video available at

https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy00000000003560

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu>) to establish reasonable accommodations.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.