

Departmental Syllabus

Math 113. Mathematical Reasoning.

Text: *The Heart of Mathematics 2/e* by Burger and Starbird

Your syllabus should contain:

- The course title, number, and description.
- The section number, time, and location.
- Your name, office hours, and contact information.
- Information about the textbook and any required materials.
- The departmental grading scale, including an explanation of what is meant by “written work” and “other” in your section.
- Your attendance policy.
- Your make-up exam policy. Please be sure that your policy treats fairly students who miss class due to University-sanctioned activities or due to illness, accident, death in the family, or other circumstances beyond the student’s control.
- Any other class policies.
- The disability clause.
- Information about academic integrity.
- University drop deadlines. See Key Dates and Timetable (available from registrar’s office) for details.
- Other important dates (such as test dates).

The schedule plans 32 of the 42 days of instruction for classes which meet three days per week (abbreviated as MWF) and 22 of the 28 days for classes which meet twice a week (abbreviated as TR). The remaining days can be used for exams, review, extra coverage of topics in this syllabus, extra topics from the book, departmental business, or other activities the teacher feels are of value to the class.

Departmental Grading Scale:

Assessment	% of grade	Points
Midterm Exam Total (3 or 4 exams)	50%	240
Written work/Quizzes	25%	120
Other	4.2%	20
Final Exam	20.8%	100
Total:	100%	480

Letter	Points	Letter	Points
A	432–480	C	336–349
A–	417–431	C–	321–335
B+	398–416	D+	302–320
B	384–397	D	288–301
B–	369–383	D–	274–287
C+	350–368	F	0–273

During the semester (in addition to the final exam), there should be three exams for classes that meet twice a week and four exams for classes that meet three times a week. Homework assignments should be based on this syllabus. Teachers may choose how to organize the homework (as short daily assignments, as longer problem sets, or in some other form) and to what extent it is graded or otherwise evaluated. Problems numbered 1–5 are very basic checks of concrete concepts; those numbered 6 and higher should be the focus of the assignments. The most in depth problems are indicated in **bold** on this syllabus.

A project may be included in this course. The project can be a structured activity where students write a paper (and possibly create a poster) explaining a section of the textbook not covered in class or it can be an open-ended assignment in which the students demonstrate their understanding of a mathematical idea through scholarly or creative means. Other written assignments are also possible.

The “other” category of the grade may come from attendance, participation, effort, or other such incidental scores.

The *Instructor Resources* contains valuable information for planning lessons. Everyone should take advantage of its advice for effectively teaching from this textbook.

Problem Solving: Chapter 1 (MWF: up to 2 classes, TR: up to 2 classes)

Topic	Homework problems
problem solving	Write up solutions to four problems of teacher’s choice.

Problem solving can be supplemented with additional materials.

Numbers: 2.1–2.3, 2.6–2.7 (MWF: 7 classes, TR: 5 classes)

Topic	Homework problems
counting and pigeonhole principle	2.1: 1, 2, 8, 15, 19
Fibonacci numbers	2.2: 2, 3, 6, 7, 17, 28, 30, 37
prime numbers	2.3: 1–5, 7, 12, 14, 15, 32, 35
irrational numbers	2.6: 1–5, 6, 10, 15, 30
real numbers	2.7: 1–5, 7, 10, 20, 23, 25, 36

Optional: To spend more time on this topic, cover 2.4 and/or 2.5

Infinity: 3.1–3.3 (MWF: 4 classes, TR: 3 classes)

Topic	Homework problems
What is infinity?	3.1: 1, 3, 8, 14, 16
one-to-one correspondences	3.2: 14, 16, 26
different sizes of infinities	3.3: 1–5, 9, 11, 14, 16, 19

Optional: To spend more time on this topic cover 3.4 (power set) and/or 3.5 (geometrical interpretations).

Geometry 1: 4.1–4.4, 4.7 (MWF: 7 classes, TR: 4 classes)

Topic	Homework problems
Pythagorean Theorem	4.1: 1–5, 6, 12, 15, 18
Art Gallery Theorem	4.2: 1–5, 9, 11, 20
Golden rectangle	4.3: 1–3, 9, 12, 13, 16
symmetry and tilings	4.4: 6, 8, 10, 12, 16
Platonic solids	4.5: 1–8
fourth dimension (optional)	4.7: 1–5, 7, 12, 14, 16, 18

Optional: To spend more time on this topic cover 4.6 (non-Euclidean geometry).

Geometry 2: 5.1–5.2, 4.5, 5.3 (MWF: 6 classes, TR: 4 classes)

Topic	Homework problems
rubber sheet geometry	5.1: 3, 4, 6, 9–12, 31, 38
nonorientable surfaces	5.2: 1–4, 8, 9, 14, 25, 33, 36
Euler characteristic, proof that there are only five Platonic solids	5.3: 1–5, 7, 9, 13, 26, 40

Decision Making: 8.2, 8.3 (MWF 6 classes, TR: 4 classes)

Topic	Homework problems
risk	8.2: 1–5, 6, 10, 11, 13, 15, 17, 20, 21, 22
financial math	8.3: 1–3, 8, 9, 11, 12, 15, 16, 19

Optional: To spend more time on this topic cover 8.4 (voting)

Suggested Calendar

Math 113. Mathematical Reasoning.

Please feel free to make slight changes to accommodate drop deadlines, breaks and vacations, and other issues that may call for rearranging the schedule. However, please be sure that your pacing of the course allows for adequate coverage of topics in the departmental syllabus.

MWF classes: 42 days of instruction

day	topic	day	topic
1	intro + problem solving	22	section 4.3
2	problem solving	23	section 4.4
3	section 2.1	24	section 4.4
4	section 2.2	25	Review
5	section 2.2	26	Test 3
6	section 2.3	27	section 4.5
7	section 2.3	28	sections 4.5
8	Review	29	section 4.7
9	Test 1	30	section 4.7
10	section 2.6	31	section 5.1
11	sections 2.6 and 2.7	32	section 5.2
12	section 2.7	33	Review
13	section 3.1	34	Test 4
14	section 3.2	35	section 5.3
15	sections 3.2 and 3.3	36	section 8.2
16	section 3.3	37	section 8.2
17	Review	38	Finance (8.3)
18	Test 2	39	Finance
19	section 4.1	40	Finance
20	section 4.2	41	Finance
21	sections 4.2 and 4.3	42	Review

TR classes: 28 days of instruction

day	topic	day	topic
1	intro + problem solving	15	sections 4.1 and 4.2
2	problem solving	16	section 4.3
3	section 2.1	17	section 4.4
4	section 2.2	18	section 4.5
5	section 2.3	19	section 4.7
6	Review	20	Review
7	Test 1	21	Test 3
8	section 2.6	22	section 5.1
9	section 2.7	23	section 5.2
10	section 3.1	24	section 5.3
11	section 3.2	25	section 8.2
12	section 3.3	26	Finance (8.3)
13	Review	27	Finance
14	Test 2	28	Review