

# Math 371 Syllabus: Fall 2011

**Section:** 001

**Times and locations:**

3:00-3:50pm, MWF, 112 TMCB

**Professor:** Tyler Jarvis

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Office hours: MF 2-2:50pm, W 1:00-1:50pm. Other times by appointment.

**Grader/TA:** Amanda Francis

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**Text:** *Abstract Algebra, An Introduction*, Second Edition, by Thomas W. Hungerford, Brooks/Cole, ISBN 978-0-03-010559-3

**Recommended Supplement:** Polya, George. *How to solve it*, Princeton University Press

**Course Objectives:**

- Development of general intellectual and mathematical ability, including
  - The ability to learn complex new concepts independently.
  - The ability to recognize and correct errors in your and others' work.
  - A growing mastery of logical reasoning and the ability to write proofs.
  - The ability and confidence to attack and solve an unfamiliar problem.
  - The discipline to keep working on a difficult problem until you solve it.
- Development of the ability to communicate complex ideas clearly and correctly, both orally and in writing.
- Mastery of the core topics of Math 371. This is roughly the material in the first seven chapters of the text. A more detailed list of these objectives is posted at [http://math.byu.edu/wiki/index.php/Math\\_371](http://math.byu.edu/wiki/index.php/Math_371)

**Class webpage:** New announcements, copies of course materials, other information, as well as the reading quizzes, online homework, and other aspects of the course will be posted on the class webpage at [Online.byu.edu](http://Online.byu.edu) Use your BYU netID and Route-Y password, then go to "Math 371 Sec 1 Jarvis Abstract Algebra Fall 2011." Alternatively, you can go directly to <https://online.byu.edu/course/view.php?id=136>

The first time you sign in you will need to give the "enrollment key," which is "AlgebraIsUseful". After that, you will only need your BYU netID and password.

**Preparation:** The prerequisites for this class are math 290 and math 313. If you have not had these courses or their equivalent, or if you did poorly in them (B- or worse) I strongly encourage you to (re)take those courses before taking this one.

**Workload:** As President Bateman has said:

"You must study! It takes approximately three hours of study outside class for every hour in the classroom. If you take 15 hours of credit, you should allocate upward of 45 hours for study per week." (Sept 7, 1999 devotional)

**Reading:** We cannot cover all the material in class. We will really only have time to help you understand the most difficult parts and help you see what the main issues are. In order for me to do that effectively, you must read the text *before* class, try to do some of the homework, and come prepared with questions about the reading and homework. We will have daily reading quizzes for you to take online to help motivate you and so that you can tell me what was most confusing for you in each section.

**Homework:** Like most worthwhile things, mathematics cannot be learned by watching someone else do it. You have to do it yourself. Exercises have three main purposes:

1. To help you learn the material and memorize the concepts.
2. To help you learn how to solve new problems, discover mathematical arguments, and write those arguments (thus homework must be grammatically and mathematically correct).
3. To help you learn to present coherent oral arguments to others and to learn from the interplay of your ideas

with theirs.

Therefore, we will have both written and oral presentation of your solutions to the exercises.

*Written exercises:*

- Written exercises will be due every day of class, as listed on the schedule below.
- We will have answers to selected problems available to you, and you are expected to correct your own answers against those before submitting them.
- Always show your work, not just an answer. This class is about proofs, ideas, and thinking—not about the final answer. No credit will be given for problems if you do not show your work or your proofs, or if it appears that your answers are just copied from the answers we have given you.
- To ensure that you get full credit for your work, please include your name and student ID number on your homework. Staple all pages together.
- Write your work clearly and neatly, and use full sentences and correct grammar in all your work.
- Late assignments will receive half credit. No assignments can be accepted after the last day of class (December 8).

*Oral Presentations:* I will often call on students from the class present their solutions to various problems.

- Oral presentations are responsible for 10% of your grade, and to earn full credit in this category, you must give a clear and correct presentation at least twice in the semester.

**Electronic devices:** Please do not text, call, surf, listen to music, or type in class, and do not permit your phone or other devices to ring, or vibrate, or otherwise distract your classmates.

**Help!** If you are adequately prepared for the class, and if you do the reading and homework on time, you should have no serious trouble. Nevertheless, solving real mathematics problems—not just the routine drills that you have seen in lower-level classes—requires significant mental effort. You will have to struggle with these problems *after you understand the basic concepts*. They will not come without substantial intellectual work. When you do have serious difficulties, you have several sources of help:

- Reread the text and make sure you really understand the concept.
- Try the steps in Polya's list (on the back of this syllabus), and look at his book (Polya, George. *How to solve it*, Princeton University Press), for sale in the bookstore (2<sup>nd</sup> floor—not textbooks).
- Ask questions in class (remember that you are supposed to try to do the problems BEFORE we talk about the concepts in class). This not only helps you but also your classmates.
- Office hours and review sessions. I have regular office hours and the TA will hold review sessions weekly. We would love to see you there. If you can't make the scheduled times, we will make an appointment for another time.
- Math lab. The math lab has some (but not many) student helpers that can assist with 371, but don't let them just tell you the answer—be sure that you really understand what is going on and can work similar problems *without help* from the math lab.
- Tutors: I do not recommend that you hire a tutor—they tend to become a crutch. If you think you really need one, come talk to me before you spend your money.

**Grades:** Grades will be based approximately on the following ratios:

Homework:	20%
Oral Presentations:	10%
Quizzes	10%
Midterms:	15% each
Final Exam:	30%

Final letter grades will be assigned by the standard BYU scale (<http://saas.byu.edu/registrar/records/grades.php>)

A Excellent	D Minimum Passing
B Good	E Failure
C Satisfactory	

**Exams:** Makeup exams must be scheduled before the regular exam date. If you absolutely cannot take the exam at the regular time, you must tell me in advance so that I can help you schedule a different time to take it. Otherwise, you cannot make up the exam (unless you were in the hospital, or were victim of a major disaster).

Unless otherwise stated, no books, notes, calculators, or other electronic devices will be allowed in the exams.

**Exam schedule:**

First Midterm Exam	Mon, Oct 3, in the testing center
Second Midterm Exam	Thurs, Nov 3, in the testing center
Final Exam	Dec 12–16, in the testing center

**Cheating and Plagiarism:** Although I encourage you to work together on many projects, to talk together about your homework, and to study together, there are limits that you should observe. All work that you turn in under your name must be written by you, and be written in your own words, or properly attributed. Any sentence, phrase, or idea that is due to someone else must be properly attributed to the true author. Failure to give credit to the true author constitutes cheating or plagiarism. We will not tolerate plagiarism or cheating in this class—it is both dishonest and unfair to other members of the class.

I fully support all of the University's penalties for cheating and plagiarism, which are generally an unforgivable F in the course and possible suspension from the university, as well as prosecution for any violations of the law.

Nevertheless, I believe in repentance; namely, if you have cheated or plagiarized, and you, feeling remorse, tell me before you are caught, we will arrange with you some way to make restitution without suffering the above-named penalties. If you are sure that you are going to fail unless you cheat, come to me, and we will arrange an honest alternative.

**Preventing Sexual (or other) Harassment:** I expect that you will all treat each other with respect and kindness. BYU's policy against sexual harassment protects both employees of the University and students. Under Title IX of the Education Amendments of 1972, students who encounter sexual harassment from other students are protected. If you encounter unlawful sexual harassment, or other inappropriate behavior, please talk to me; contact the campus EEO office (2-5895); or contact the Honor Code Office (2-2847).

**Students with Disabilities:** BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have a disability that may adversely affect your performance in this class, please contact the university's Accessibility Center at 422-2767. Services deemed appropriate will be coordinated with the student and instructor by that office.

**Caveat:** This syllabus and the assignment schedule are always subject to change. Additional projects or assignments may be announced at any time, in which case the above grading percentages will change accordingly. All changes will be announced in class.

# HOW TO SOLVE IT

Summary taken from G. Polya, "How to Solve It", 2nd ed., Princeton University Press, 1957, ISBN 0-691-08097-6.

1. UNDERSTANDING THE PROBLEM: First. You have to understand the problem.

- What is the unknown? What are the data? What is the condition? Is it possible to satisfy the condition? Is the condition sufficient to determine the unknown? Or is it insufficient? Or redundant? Or contradictory?
- Draw a figure. Introduce suitable notation.
- Separate the various parts of the condition. Can you write them down?

2. DEVISING A PLAN Second. Find the connection between the data and the unknown. You may be obliged to consider auxiliary problems if an immediate connection cannot be found. You should obtain eventually a plan of the solution.

- Have you seen it before? Or have you seen the same problem in a slightly different form?
- Do you know a related problem? Do you know a theorem that could be useful?
- Look at the unknown! And try to think of a familiar problem having the same or a similar unknown.
- Here is a problem related to yours and solved before. Could you use it? Could you use its result? Could you use its method? Should you introduce some auxiliary element in order to make its use possible?
- Could you restate the problem? Could you restate it still differently? Go back to definitions.
- If you cannot solve the proposed problem, try to solve first some related problem. Could you imagine a more accessible related problem? A more general problem? A more special problem? An analogous problem? Could you solve a part of the problem? Keep only a part of the condition, drop the other part; how far is the unknown then determined, how can it vary?
- Could you derive something useful from the data? Could you think of other data appropriate to determine the unknown? Could you change the unknown or data, or both if necessary, so that the new unknown and the new data are nearer to each other?
- Did you use all the data? Did you use the whole condition? Have you taken into account all essential notions involved in the problem?

3. CARRYING OUT THE PLAN. Third. Carry out your plan.

- Carrying out your plan of the solution, check each step.
- Can you see clearly that the step is correct?
- Can you prove that it is correct?

4. LOOKING BACK. Fourth. Examine the solution obtained.

- Can you check the result? Can you check the argument?
- Can you derive the solution differently? Can you see it at a glance?
- Can you use the result, or the method, for some other problem?