MTH 299 Course Syllabus
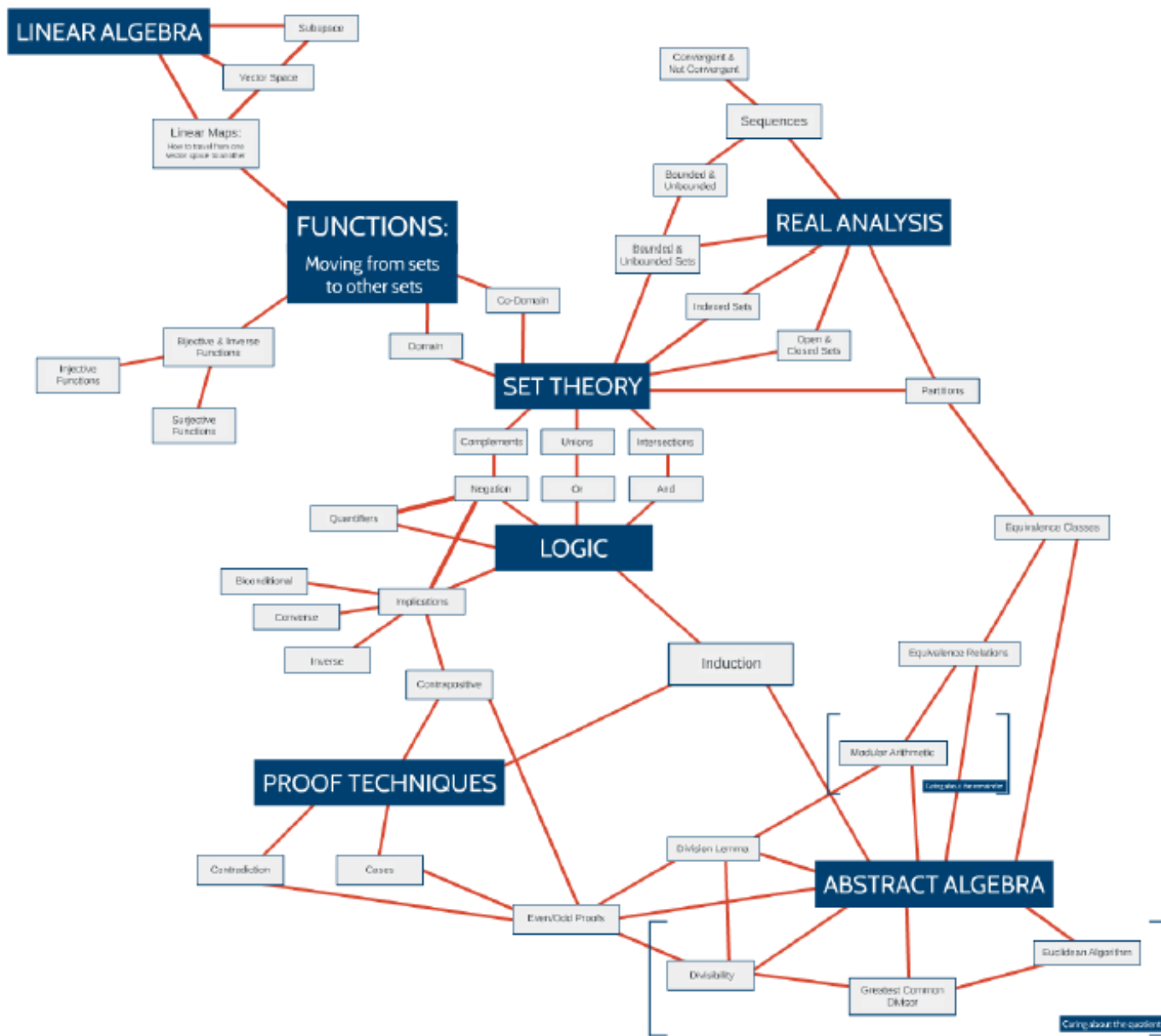
Fall 2016 Section 001 (Viswanathan)

Last updated on: August 27, 2016

Contents

Who/What/Where/When

People to Know

ITEM	INSTRUCTOR	TEACHING ASSISTANT
Name	Aditya Viswanathan	Daniel Thibodeau
Office Location	C331 Wells Hall	N/A
Email	`aditya@math.msu.edu`	`thibod31@msu.edu`
Office Hours	MF 2-3pm, Tu 11am-12pm	N/A

Places to Be

WEEKDAYS	LOCATION	TIME	ITEM
MWF	A301 Wells Hall	12:40PM-1:30PM	Class
Th	218 Ernst Bessey Hall	12:40PM-2:00PM	Recitation

Expectations

I expect you to be an active, hardworking, diligent, and competent learner. I expect you to attend lectures regularly. I expect you to spend approximately 12 hours per week outside of lecture combined between the tasks of reading, completing reading checks– 1-1.5 hours– and working on homework problems– 10.5-11 hours. (Bases on standard expectations of 3 hours outside of class, per credit hour of enrollment.) I expect you to ask lots of questions. I expect you to frequently visit office hours or the MLC.

Course Objectives

This course acts as a bridge from your training in calculus which typically focuses on formulas and calculations to that of higher mathematics which focuses on abstraction, problem solving, and proof. You will be taught to think independently, to digest abstract concepts and tools from higher mathematics, and to express yourself clearly in a mathematical proof. You will be exposed to and learn some basic concepts from real analysis (rigorous calculus), linear algebra (things similar to vectors and matrices from vector calculus), and number theory. You will be expected to become proficient with the structure of mathematical logic, including truth tables, and you will be expected to become proficient in some basic styles of proof, such as: direct proof, proof by contradiction, proof by induction, proof by contrapositive, equivalences, and more.

Grades

Overall

Your course grade will be based on:

PARTICIPATION	HOMEWORK	MINI EXAM	EXAM 1	EXAM 2	FINAL	TOTAL
7%	19%	4%	17.5%	17.5%	35%	100%

In addition, you must take the final examination in order to pass the course.

All assessment items (e.g. exams, semester-long cumulative homework score, etc...) will be scaled at the discretion of the instructor, and they will be recorded and communicated as a rational (decimal) number between 0 and 5– to keep stylistically as close to the MSU points scale. That way, the student can know on each particular assessment, how their performance was rated overall. The course grade will simply be calculated according to the weighted average indicated by the table above, given by the formula

$$CG_1 = 0.07 * P + 0.19 * HW + 0.04 * Mini + 0.175 * E1 + 0.175 * E2 + 0.35 * FE,$$

where P, HW, $Mini$, $E1$, $E2$, and FE are respectively your point values for the items of participation, homework, mini exam, exam 1, exam 2, and the final exam.

IF you finish the semester with a homework average of 43/60 or greater, **AND** your participation average is greater than 80%, then you will have the advantage of improving your grade by a strong performance on the final exam. If you satisfy these requirements, your course grade will instead be determined by

$$CG = \max\{CG_1, CG_2\},$$

where CG_2 is computed by

$$CG_2 = 0.81 * FE + 0.19 * HW.$$

That is to say, your course grade will be the *better* of the two grades: CG_1 and CG_2. The reason for doing this is to encourage hard work all the way until the end, and to properly reflect the fact that this material is challenging for many students, and it may take the whole semester for some to truly master it. This way, you can prove to me on the final exam that you are deserving of the excellent grade that you most likely want.

Final grades will be determined by:

4.0 GRADE	0.0	1.0	1.5	2.0	2.5	3.0	3.5	4.0
CG	[0,1)	[1,1.5)	[1.5,2)	[2,2.5)	[2.5,3)	[3,3.5)	[3.5,4)	[4,5]

Assessment - Participation

In our class there will be 2 different participation grades aimed to help you master the material.

Attendance (3%) - Come to class, do the work, get some points. Easy as that.

Online Reading Checks (4%) - In order to encourage you to read the book before coming to class there are reading checks online (in the form of D2L quizzes). Reading the book to gain multiple exposures to the material is key to retaining it for quizzes, exams, and life. Due dates are posted on D2L and line up with when we need the material in class.

Assessment - Mini Exam

The Mini Exam is another way for you to get practice performing problems under pressure. This is like a long quiz (and is worth more points). The Mini Exam is tentatively scheduled for **September 22rd, 2016, during recitation,** and will cover material presented in class up until that point.

Assessment - Midterm Exams

Midterms are 80 minutes long and are tentatively scheduled for **October 13th, 2016** and **December 1, 2016**, both during recitation.

Assessment - Homework

Homework is easily the most important activity for learning in this course (and any mathematics course, really). As adviser said to us at the beginning of graduate school, mathematics is not a spectator sport!, so stop watching people solve math problems, and go do it yourself. **A paper print out of the Homework** will be **due at the beginning of class** (typically each Wednesday), and will involve both short answer and proof type questions. **Your solutions must be typed in LATEX and printed out to be counted.** Each homework will be worth 60 points and it is very important that claims and statements in your answers are justified. In the words of my favorite undergraduate teacher, a proof is your attempt to convince someone that a certain statement is true, and therefore I need to be convinced that you know what you are talking about and that your assertions are indeed true. In addition, a copy of your homework .TEX document and .PDF must be submitted to D2L (due date/time for each assignment is on D2L). Forgetting to do this on an assignment will lose you 10 points.

A special note on homework grading: There are many of you, and only one of me! So I will be unable to grade every homework problem which you hand in. I will make a selection of homework problems to grade each week at my discretion. With your help I will do my best to provide solutions to the homework so that all of your hard work can be put to good use in learning/practicing the material in this course.

Assessment - Final

By registering for this class, you understand that the final exam is a mandatory part of the course. The final exam is scheduled for **Tuesday, December 13th, 2016 10:00AM-12:00PM** in a location to be announced in class at a later date. The final is cumulative.

Calculating your Final Grade

To calculate your final grade you will take your MSU point grade from each Assessment Topic and multiply it by the Assessment weight. Sum the results to get your current course grade.

EXAMPLE:

Assessment	PARTIC.	HW	MINI EXAM	EXAM 1	EXAM 2	FINAL	SUM
Weight	7%	19%	4%	17.5%	17.5%	35%	
Student Scores	3.1	2.6	1.25	4.1	3.71	3.68	
Mult. Result	**.217**	**.494**	**.05**	**.7175**	**.64925**	**1.288**	**3.41575**

*Since this is less than 3.5 but greater than a 3.0 this student would receive **get a 3.0 in the course.***

Supplies

Course Materials:

CATEGORY	ITEM	DESCRIPTION
Textbook	How to Think Like a Mathematician by Kevin Houston	For reading and learning
Textbook	Class Notes PDF (please print)	For reading and learning
Packet	Class Examples PDF (please print)	Contains the Examples we will cover.
Electronics	Printer	To print anything you need and homework submissions.
Electronics	Computer	To check email and write LaTeX HW

In Class Materials:

It is mandatory that you bring the textbook(s) and examples packet to all class and recitation meetings.

Late/Missing...

Late/Missing Homework Policy

Late homework will not be accepted without a serious and valid excuse, verified by a note from an appropriate professional. To justify this strict policy, I will DROP the 3 lowest homework scores from each student during the semester. Therefore, you get 3 free occasions to turn in your homework late by exercising your free drop on that particular homework.

Late/Missing Exam Policies

Typically a missed exam is given a 0. There are no make up exams. Please make sure to arrive on time and prepared. You know all the (tentative) exam dates! Please minimize your risk around exam dates and email your instructor and collect crazy amounts of documentation (ideally from professionals) if anything unforeseen occurs on the exam day.

Administrative Drop for Non-Attendance

Students will be dropped from this course for non-attendance by a departmental administrative drop after the fourth class period, or the fifth class day of the term of instruction, whichever occurs first.

Additional Help

In addition to class, recitation, and instructor office hours there are also times in which the MTH 299 TAs tutor int the Math Learning Center (MLC). These hours are available at:

`http://math.msu.edu/mlc/default.aspx?courseid=299`

There is also a class forum: `https://piazza.com/class/irw5neru386p2` in which you can ask questions to your fellow classmates, the TA, and the instructor. It is recommended that when you have a homework question that you use this forum so that way everyone can see the response!

Hints for Success

Often when the instructor or TA presents problems in class they are the polished solutions but in this class we need to realize that it takes a good amount of work to get to that point. It is a process! Here is a typical study cycle that can help you master the material.

The 299 Study Cycle

1. read text, attempt examples in text, but don't waste too much time.
2. ask questions
3. do examples in class/recitation.
4. ask questions
5. look at solutions of examples in class
6. ask questions
7. work on HW (start but maybe not complete each question)
8. ask questions
9. finish the HW
10. look at HW solutions
11. ask questions
12. read and digest the graded HW, try to figure out what went wrong
13. ask questions
14. revisit examples and HW to make sure you can successfully complete them now.
15. ask questions
16. REPEAT!

Schedules and Dates

Tentative Topics List

We will cover at least some of the material from each of the chapters in the textbook. We will have many supplementary examples provided in class.

Tentative Weekly Schedule

(updates can be found on D2L)

Date	Wkday	Wk#	L/R #	Topics	Assessment
8/31/2016	W	1	L1	Hello. What is this class about? Syllabus. Some basic defs about sets and N, Z (note the typo in the def on p.5), R. Time permitting, discuss some operations on sets.	HW1 Avail
9/1/2016	R	1	R1	Mostly TA present material. Sets. Set operations. Defining sets via "all x such that". Demonstrate what careful solutions look like to familiar calculus questions.	
9/2/2016	F	1	L2	Finish operations on sets.	RC1.1 Due
9/5/2016	M	2		No Class	
9/7/2016	W	2	L3	Functions. Injective, surjective, and bijective.	HW1 Due, HW2 Avail, RC2.1 Due
9/8/2016	R	2	R2	Examples related to hw2. Venn diagrams. Functions. Go over HW1, the student solutions document	
9/9/2016	F	2	L4	Functions.	RC2.2 Due
9/12/2016	M	3	L5	More on functions. Injectivity and surjectivity and bijectivity. Inverse.	RC3.1 Due
9/14/2016	W	3	L6	Introduce statements.	HW2 Due, HW3 Avail, RC3.2 Due
9/15/2016	R	3	R3	Examples related to hw3. . Induction problems. Function problems. Go over HW2, the student solutions document	
9/16/2016	F	3	L7	Induction. Statements (Negation, And, Or).	RC3.3 Due
9/19/2016	M	4	L8	Induction. Statements (Negation, And, Or).	
9/21/2016	W	4	L9	Implications and contradiction	HW3 Due, HW4 Avail, RC4.1 Due
9/22/2016	R	4	R4	MINI EXAM (final 35 minutes of class). Go over HW3 and or incorrect solutions to HW2.	
9/23/2016	F	4	L10	Implications and contradiction	RC4.2 Due
9/26/2016	M	5	L11	Implications and contradiction	
9/28/2016	W	5	L12	Implications, continued. Equivalent, converse, contrapositive.	HW4 Due, HW5 Avail, RC5.1 Due
9/29/2016	R	5	R5	More on implications. Go over HW4, the student solutions document	
9/30/2016	F	5	L13	More on implications and other problem solving from previous topics.	RC5.2 Due
10/3/2016	M	6	L14	More on implications and other problem solving from previous topics.	
10/5/2016	W	6	L15	Quantifiers.	HW5 Due, HW6 Avail, RC6.1 Due
10/6/2016	R	6	R6	More quantifier examples. Go over HW5, the student solutions document.	
10/7/2016	F	6	L16	Quantifiers.	RC6.2 Due
10/10/2016	M	7	L17	Quantifiers and tie up random loose ends before Exam1.	
10/12/2016	W	7	L18	Review for Exam1	HW6 Due, HW7 Avail
10/13/2016	R	7	R7	EXAM 1	
10/14/2016	F	7	L19	First real analysis day. Bounded sets, indexed union, intro to sequences.	

Date	Wkday	Wk#	L/R #	Topics	Assessment
10/17/2016	M	8	L20	More on first set of real analysis topics. EXTRA SESSION in the evening to return and go over Exam1	RC8.1
10/19/2016	W	8	L21	Second real analysis day. Open / closed sets, partitions, more sequences.	HW7 Due, HW8 Avail, RC8.2 Due
10/20/2016	R	8	R8	Examples for real analysis, all. Go over HW7, the student solutions document.	
10/21/2016	F	8	L22	Real analysis examples.	RC8.3 Due
10/24/2016	M	9	L23	Real analysis examples.	
10/26/2016	W	9	L24	First lilnear algebra day. Vector spaces and linear functions.	HW8 Due, HW9 Avail, RC9.1 Due
10/27/2016	R	9	R9	Linear algebra examples. Go over HW8, the student solutions document.	
10/28/2016	F	9	L25	Linear algebra examples.	RC9.2 Due
10/31/2016	M	10	L26	Linear algebra examples.	
11/2/2016	W	10	L27	Second linear algebra day. More on vector spaces and linear functions.	HW9 Due, HW10 Avail, RC10.1 Due
11/3/2016	R	10	R10	More on linear algebra. Go over HW9, the student solutions document.	
11/4/2016	F	10	L28	More on linear algebra.	RC10.2 Due
11/7/2016	M	11	L29	More on linear algebra and other problem solving / previous topics	
11/9/2016	W	11	L30	First number theory day. Primes, divisibility, gcd, modular congruence.	HW10 Due, HW11 Avail, RC11.1 Due
11/10/2016	R	11	R11	Number theory examples. Go over HW10, the student solutions document.	
11/11/2016	F	11	L31	More on number theory.	RC11.2 Due
11/14/2016	M	12	L32	More on number theory.	
11/16/2016	W	12	L33	Second number theory day. Relations / equivalence relations.	HW11 Due, HW12 Avail, RC12.1 Due
11/17/2016	R	12	R12	More on number theory, especially equivalence relations. Go over HW11, the student solutions document.	
11/18/2016	F	12	L34	More on number theory.	RC12.2 Due
11/21/2016	M	13	L35	More on number theory.	RC13.1 Due
11/23/2016	W	13	L36	Generic examples work session	HW12 Due, HW13 Avail
11/24/2016	R	13		No Class	
11/25/2016	F	13		No Class	
11/28/2016	M	14	L37	Catch-all for topics in HW7-HW13.	
11/30/2016	W	14	L38	Review for Exam2.	HW13 Due
12/1/2016	R	14	R13	EXAM 2	
12/2/2016	F	14	L39	Review for final exam.	
12/5/2016	M	15	L40	Return and go over Exam2.	
12/7/2016	W	15	L41	Review for final exam.	
12/8/2016	R	15	R14	Review for final exam.	
12/9/2016	F	15	L42	Review for final exam.	

Important Dates

WEEKDAY	DATE	EVENT
Wednesday	8/31/16	Classes Begin.
Monday	9/5/16	Holiday – University closed.
Wednesday	9/7/16	Online open add period ends at 8pm.
Thursday Wednesday	9/8/16-9/14/16	Students go to Undergraduate office, C212 Wells Hall for Mathematics enrollment changes. (Late adds, drop to lower course, section changes)
Wednesday	9/14/16	Last day to late add a course or change sections within a course. Last day to drop to a lower level course.
Monday	9/26/16	End of 100% Tuition Refund
Wednesday	10/19/16	Middle of Semester. Last day to drop a course without a grade being reported.
Friday	12/9/16	Last day of classes.

Other Policies

The Spartan Code of Honor Academic Pledge:

http://splife.studentlife.msu.edu/spartan-code-of-honor-academic-pledge
"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Academic Honesty

Article 2.3.3 of the Academic Freedom Report states that The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards. In addition, the Mathematics Department adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site: www.msu.edu.) Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the Academic Integrity webpage.)

Limits to confidentiality

Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the Universitys student record policies. However, students should be aware that University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructor, I must report the following information to the Department of Police and Public Safety if you share it with me: Suspected child abuse/neglect, even if this maltreatment happened when you were a child, Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and Credible threats of harm to oneself or to others. These reports will trigger contact from the Department of Police and Public Safety who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.

Accommodations for Students with Disabilities (from RCPD)

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation (VISA) form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.). Requests received after this date may not be honored.

Disruptive Behavior

Article 2.III.B.4 of the Academic Freedom Report (AFR) for students at Michigan State University states: The students behavior in the classroom shall be conducive to the teaching and learning process for all concerned. Article 2.III.B.10 of the AFR states that The student has a right to scholarly relationships with faculty based on mutual trust and civility. General Student Regulation 5.02 states: No student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Judicial Affairs office.