

MTH 421-001 Analysis II, Spring 2020 Course Syllabus

Instructor:	Leonid Chekhov
Lectures:	MWF 11:30 a.m. - 12:20 p.m. in A230 WH
Instructor's Office:	D-203 WH
Instructor's Office Hours:	Tue: 1pm - 2pm, Thu: 1pm - 2pm and by appointment
Instructor's e-mail:	chekhov@msu.edu

Required Course Materials

- Textbook: *An Introduction to Analysis* (4th Edition), William R. Wade, Pearson, ISBN: 978-0-13-229638-0
- I will put online my lecture notes (in due course).

Prerequisites and Topics

This course is the continuation of MTH320 (Analysis I)

The course will cover Secs. 5.1-5.4, 7.1-7.4 (and partially 7.5 (Thm7.60)), 8.1-8.4, 9.1-9.5 (and partially 9.6: statements 9.41–9.43 and Thm 9.51), 11.1-11.6 (and partially 11.7—Lagrange multipliers), and elements from 12.3-12.5 (iterated integrals, change of variables—polar and spherical coordinates, Gamma function and volumes) of the textbook, including the Riemann integral, recalling power series from Analysis I, multidimensional theory: Euclidean spaces, topological properties, convergence of sequences and sequences of functions, continuous functions, metric spaces, and differentiation in \mathbb{R}^n .

Attendance

Students are expected to attend all class meetings and are responsible for all of the material covered in class and in the homework. Any changes in this syllabus or in the scheduling of exams, etc. will be announced during class meetings (usually at the beginning of class so please don't be tardy).

Class Expectations

1. You are expected to come to every class.
2. You are expected to own the book.
3. You are expected to pay attention and participate in class.
4. You are expected to spend at least 2 hours between each lecture working on your homework, reading the book, lecture notes and supplementary materials.

Exams and Other Important Dates

Martin Luther King Jr. Day	Monday, January 20
Last day to drop the class with tuition refund	Friday, January 31
Midterm Exam I	Friday, February 7
Last day to drop the class with no grade reported	Wednesday, February 26
Spring break	March 2-6
Midterm Exam II	Friday, March 13
Midterm Exam III	Friday, April 10
Final Exam	Thursday, April 30, 12:45pm - 2:45pm in A230 Wells Hall.

Evaluation

There will be three in-class exams (15% each), graded homework (20%), and a final exam (35%). Prior to every in-class exam I will distribute a sample exam to be collected on the review class preceding the in-class test and graded as an additional homework. I'm also planning to have three laboratory classes during the semester aimed on collective studies during your class time; every laboratory work will be graded also as a homework. Three worst homework grades will be dropped. The grading scale will be no worse than what is shown below:

Graded Components		Grading Scale (x is your percent score)	
Homework	20%	4.0	$90 \leq x$
		3.5	$85 \leq x < 90$
Midterm Exams	$3 \times 15\%$	3.0	$80 \leq x < 85$
Final Exam	35%	2.5	$75 \leq x < 80$
		2.0	$70 \leq x < 75$
Total grade out of	100%	1.5	$65 \leq x < 70$
		1.0	$60 \leq x < 65$
		0.0	$x < 60$

Grading Criteria

All of your work in the course will be graded according to three criteria.

1. Does your work **effectively communicate** your reasoning and methods?
2. Does your work **completely answer** the question posed?
3. Does your work **correctly answer** the question posed?

Exams Your lowest midterm exam percentage will be replaced with your final exam percentage if doing so raises your grade. There are NO make-up exams, a missed exam, for any reason, will be counted as your lowest. You should not miss more than one exam. The university does not permit early final exams for any reason. The final is cumulative. No student should miss the final.

Homework

Homework will be assigned weekly and collected either Wednesday or Friday (see the list of assignments at the end of syllabus) in class, unless stated otherwise. Your lowest three homeworks (this includes special homeworks and laboratory works) will be dropped. No late homework is accepted. Each homework assignment is worth 20 points. Not every homework problem will be graded; but using those which are graded a score from 0 to 20 will be determined. The homework must be written in a clear manner to make the argument readily understandable. If a grader cannot easily follow your work, you will lose points. You are free to discuss homework problems with peers and use additional resources, but your submitted homework should be your own work, written in your own words and you need to cite all used resources. There will be three **special** homeworks preceding three in-class tests; they will be collected at the beginning of the Wednesday class preceding a Friday test and they will be graded the same way as tests that follow; solutions to these homeworks will be reviewed the same day, on a Wednesday class. Besides this there will be two or three in-class laboratory works intended for studies in small (4-5 students) groups. They will be also graded as (special) homeworks.

If you have any questions regarding the homework, be sure to come to office hours or communicate by email.

Honors Option

For those students who will be seeking for a honor option, a student must express her/his willingness during the first two weeks of classes. A student may withdraw from the honor option any time with no consequences. There will be additional evening sessions of the course on Wednesdays: everyone is welcomed to attend, students with honor option are supposed to attend; besides that there will be small projects distributed at the beginning of semester; in the last week of classes I will organize an evening

session with student's presentations (possibly attended by other professors from the math department). I hope this could be useful for boosting student's creativity and may help in a preparation to more demanding diploma projects.

Students with Disabilities:

MSU has a Resource Center For Persons with Disabilities (RCPD): <http://www.rcpd.msu.edu/> Please contact the RCPD if you require special accommodations, and then schedule an appointment to meet with your instructor and accommodations can be provided.

Academic Honesty

Cheating in any form will not be tolerated. You will receive a zero on any assignment in which there is a case of cheating. This includes, but is not limited to, plagiarism, failure to give proper citations, and copying another's work.

If you are preparing an assignment and have a question about whether you are adhering to this policy, please ask your instructor. If you work on an assignment with other students, you must give credit to your collaborators. MSU's policy on academic integrity can be found at the following URL:

<https://www.msu.edu/~ombud/academic-integrity/index.html>.

Student Responsibilities

Read outside of class. You should always have paper and pencil readily available when reading a mathematical text. Work through the examples by writing the steps out yourself until it is clear to you that the solution in the textbook is correct. Once a topic has been introduced in lecture, I recommend you to read the corresponding sections from the text. I encourage you to work with other students and to help one another succeed in the course. However, when you turn in your work, **your solution should be your own**, written independently in your own words.

Participate in class. Be attentive and stay alert. Work with your classmates, especially those adjacent to your seat. Take careful notes on those topics which are unfamiliar. Ask questions! Don't be shy: we all are here to learn! And, please, be aware that any distraction, active or passive, is harmful for your success, see <https://news.rutgers.edu/cellphone-distraction-classroom-can-lead-lower-grades-rutgers-study-finds/20180723#.XV1SStVubs0>.

Complete the homework assignments. Start homework assignments early and discuss these with your classmates. Write your attempts to solve the homework on scratch paper. You must re-write— carefully and neatly— your solutions according to the requested format. When your homework is returned with a grade, if points were deducted, make sure you understand why.

Utilize office hours. Please consider bringing your questions to office hours. Office hours are times set aside specifically as an opportunity for you to get additional help. If your schedule conflicts with the scheduled office hours, please make an appointment by sending a request by e-mail.

Please do not think of this as an inconvenience to your instructor; additional help is available if you seek it out. However, it is your responsibility to come to office hours only after first making a sincere effort to answer questions on your own. Learning is difficult: work hard, try new ideas, and ask questions. If you do this, you will see definite progress.

Homework

(Week 2) HW1: (Due Wed Jan 15): 5.1.0(b)(c), 5.1.2(c)[$(\alpha)(\gamma)$], 5.1.8(a)(b), 5.1.10*, 5.2.0(d), 5.2.2, 5.2.5, 5.2.6(b), 5.2.9.

(Week 3) HW2: (Due Fri Jan 24): 5.3.2, 5.3.5, 5.3.7(a)–(d),(e)*, 5.3.9, 5.3.12*, 5.4.2(a)(b)(c)(d), 5.4.7[sketch the function in question], 5.4.8, 5.4.9*

(Week 4) HW3: (Due Fri Jan 31): Sec.7.1 (5(a), 6), Sec. 7.2 (2, 3, 5, 9*), Sec. 7.3 (2(a)(b)(c),(d)*, 3(a)(b), 7(b)*(d)*), Sec. 7.4 (1(a),(d), 2(a),(d)*).

(Week 5): (Due Wed Feb 5) Preparation to the first midterm, special homework

(Week 6) HW4: (Due Fri Feb 14): Sec.8.1 (1(c)(d)(e)(f), 2(b), 5 [we can interpret **triangle sides** as **vectors** with $\mathbf{a} + \mathbf{b} + \mathbf{c} = \mathbf{0}$ for properly chosen directions], 6(a)(b), 10*) Sec 8.2 (1(a), 2(a), 5(a)(b), 6*, 8,9).

(Week 7) HW5: (Due Fri Feb 21): Sec.8.3 [1(b)(c), 2, 7(a)(c)(d), 9], Sec. 8.4 [1(a)(b)(c)(d), 3, 4(a)(b), 7, 10(c)(d)].

(Week 8) HW6: (Due Fri Feb 28): Sec. 9.1 [1(a)(b), 2(a), 3(a)(b), 4, 7(a)*], Sec.9.2 [4,6,8].

(Week 9) Spring break!

(Week 10) (Due Wed Mar 11) : Preparation to the second midterm, special homework.

(Week 11): HW7: (Due Fri Mar 20) Sec.9.3 [1(c), 2(a)(b), 6(a), 6(b)*], Sec.9.4 [1(b), 2(a), 4 [hint: use complements], 7(a)*(b)*, 8]

(Week 12-13) HW8: (Due Wed Apr 1): 9.5.2 (only part $A \cup B$), 9.6.8(a)(b)*, Sec.11.1 [1(a)(c), 2(a), 5(a)(b), 7(b)* [Use Integration by parts to evaluate integrals of the form $\int e^{-\alpha x} \sin(\beta x) dx$], 9(c)(d)].

(Week 14): (Due Wed Apr 8) Preparation to the third midterm, special homework

(Week 15) HW9: (Due Fri Apr 17): Sec.11.2 [1, 5 [solve only for $\alpha = 1$], 8], Sec. 11.3 [1(a)(d), 2(b), 8(a)(b)], Sec. 11.4 [5, 7*].

(Week 16) HW10: (Due Wed Apr 22): Sec.11.6 [9, 11(a), 11(b)*], Sec.11.7 [1(a), 3(b)], Sec.12.6 [1,4].

[problems with an asterisk are bonus problems; it is not necessary to solve them, but, if solved, such a problem adds 1 point on top of your score out of 20 point (and if your total score is 20, you'll get 21 out of 20!)]