

# Tentative Course Topics in Analysis: Fall 2020 (online):

This online course is offered mostly asynchronously. However, I do expect you follow along to keep up each week. The guide below indicates the flow of material and one possible study plan. "Tests" and "Weekly Zoom Review" require a common Zoom meeting. The "Missions" are the required homework and their due dates are given in the schedule below.

Both my notes and the Missions for this course will be posted in Blackboard. I will also post solutions to the Missions so it is crucial they be completed according to schedule so I do not have to delay sharing the solution with your fellow classmates.

**Missions (300pts)** are required homework which I provide in pdf format. I expect you to provide me a solution in the same fashion. Your writing must be clearly readable so please take time to scan the work properly.

**Tests (300pts)** given through email or Blackboard once everyone has established a Zoom connection. We will use Zoom to proctor all the Tests and the Final Exam.

**Final Exam (200pts)** comprehensive.

**Zoom Weekly Meeting (100pts)** I am hoping that each week we can talk about questions raised in the lectures of the previous week. I'll probably ask some low pressure questions about what you learned from watching the lectures posted in the previous week. These meetings will happen on my Sunday night most weeks.

**Presentation (100pts)** Sometime soon I will provide a list of topics for presentations at the end of the course. You will prepare slides and share them via Zoom with your classmates. The talk will be 15 minutes with 5 minutes for questions. I am also open to requests for topics, especially if you make the request before I provide the list.

\***NITxT = Not In Text**, for such sections this indicates I have provided a separate reference for the given topic. The documents will be found in Course Content and I usually make an announcement alerting you when I post something new.

\***Video Resource**, typically a video representative of what I would likely talk about in a Lecture for this course is given. However, some of these may be shorter than 50 minutes and others may have multiple parts in which case I will likely use Lecture 1a, Lecture 1b etc. to list the sub-Lectures. I intend to post all lectures both in Course Content and on YouTube at the playlist: <https://www.youtube.com/playlist?list=PLBY4G2o7DhF2VZ9vGFgdap7Gpt-Tm3w3x>

Alabama Date/ CDT	Topic	Section in Text	Video Resource*	Assignment due
S: 8-16	Initial Zoom Meet and Greet (starts at 10:00pm)			
M: 8-17	Basic Set Theory	1.1	Lecture 1	
T	Relations and Equivalence Relations	NITxT*	Lecture 2	
W	Functions	1.2	Lecture 3	
TH				
F				
S: 8-23	Weekly Zoom Review 1 (starts at 10:00pm)			
M: 8-24	Cardinality and Countability	NITxT	Lecture 4	
T:				
W:				
TH:				

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F:				
S: 8-30	Weekly Zoom Review 2 (starts at 10:00pm)			
M: 8-31	Induction and Well Ordering Principle	1.3	Lecture 5	
T:				
W:				
TH:				
F:				
S: 9-6	Weekly Zoom Review 2.5 (starts at 10:00pm)			
M: 9-7	Ordered Field Axioms	1.4	Lecture 6	Mission 1 due
T:	Completeness Axiom for Real Numbers	1.5	Lecture 7	
W:				
TH:				
F: 9-9				
S: 9-13	(Test I in the other course, no meeting for this course)			
M: 9-14				
T:	Applications of Completeness Axiom	1.6	Lecture 8	
W:	Convergence	2.1	Lecture 9	
TH:	Limit Theorems	2.2	Lecture 10	
F:				
S: 9-20	Weekly Zoom Review 3 (starts at 10:00pm)			Mission 2 due
M: 9-21				
T:	Test 1 in Analysis, Tuesday 10:00-11:30pm.			(this is by Zoom it covers material before Chapter 2)
W:	Monotone Sequences	2.3	Lecture 11	
TH:	Bolzano Weierstrauss Theorem	2.4	Lecture 12	
F:				
S: 9-27	Weekly Zoom Review 4 (starts at 10:00pm)			
M: 9-28	Limit Superior/Inferior	2.5	Lecture 13	Mission 3 due
T:	Topology	2.6	Lecture 14	
W:	Limits of Functions	3.1	Lecture 15	
TH:				
F: 10-2				
S: 10-4	(TEST II in the other course, no meeting for this course)			
M: 10-5	Limit Theorems	3.2	Lecture 16	Mission 4 due
T:	Continuity	3.3	Lecture 17	
W:	Properties of Continuous Functions	3.4	Lecture 18	
TH:				
F:				
S: 10-11	Weekly Zoom Review 5 (starts at 10:00pm)			
M: 10-12	Derivatives	4.1	Lecture 19	Mission 5 due
T:	Mean Value Theorem (MVT)	4.2	Lecture 20	
W:				
TH:				
F:				

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S: 10-18	Weekly Zoom Review 6 (starts at 10:00pm)			
M: 10-19				
T:	Test 2 in Analysis, Tuesday 10:00pm-11:30pm			this is by Zoom it covers material before Chapter 4)
W:	Applications of MVT	4.3	Lecture 21	
TH:	Taylor's Theorem	4.5	Lecture 22	
F:				
S: 10-25	Weekly Zoom Review 7 (starts at 10:00pm)			
M: 10-26	Contraction Mapping and Newton's Method	NITxT	Lecture 23	Mission 6 due
T:	Linear Algebra Refresh: matrices and linear maps	NITxT	Lecture 24	
W:	Frechet Derivative and Linearization of Maps	NITxT	Lecture 25	
TH:	Intuition on Inverse Function Theorem	NITxT	Lecture 26	
F: 10-30				
S: 11-1	( TEST III in the other course, no meeting for this course)			
M: 11-2	Linear Algebra Refresh: eigenvectors	NITxT	Lecture 27	Mission 7 due
T:	Multivariate Power Series and Optimization	NITxT	Lecture 28	
W:				
TH:				
F:				
S: 11-8	Weekly Zoom Review 8 (starts at 10:00pm)			
M: 11-9	No new material, time for preparing for presentation etc.			Mission 8 due
T:				
W:				
TH:				
F:				
S: 11-15	Weekly Zoom Review 9 (starts at 10:00pm)			
M: 11-16				
T:	Test 3 in Analysis, Tuesday 10:00pm-11:30pm.			(this is by Zoom, it covers material past Test 2 primarily)
W:				
TH:				
F:				
	Thanksgiving Break 11-23 to 11-27			
S: 11-29	Weekly Zoom Review 10 (starts at 10:00pm)(PRESENTATION DAY)			
M: 11-30	No new material, time to prepare for final exam.			
T:				
W:				
TH:				
	Final Exam (time and date TBA)		Comprehensive	