

Syllabus

MATH-504: Real Analysis

Course Description

This course offers a rigorous study of the real numbers and associated functions in order to deepen students' understanding of calculus and raise their ability to effectively formulate and communicate mathematics. It reviews concepts of real-valued functions defined on the real line and proceeds to extend these results to a rigorous foundation of differential and integral calculus of real functions.

Course Outcomes

Upon completion of this course, you should be able to:

1. Analyze the construction and topology of the real line as a complete ordered field.
2. Apply the concepts of convergence of sequences and series of numbers and functions.
3. Determine the continuity, differentiability, and integrability of functions.
4. Adapt concepts of real analysis to vector spaces.
5. Compose solutions and rigorous proofs of results arising in real analysis.
6. Examine God's natural order in light of mathematical understanding.

Course Textbook

Lay, S. (2014). *Analysis with an Introduction to Proof* (5th ed.). Boston: Pearson.

IWU Diversity Statement

IWU, in covenant with God's reconciling work and in accordance with the Biblical principles of our historic Wesleyan tradition, commits to build a community that reflects Kingdom diversity. We will foster an intentional environment for living, teaching and learning, which exhibits honor, respect, and dignity. Acknowledging visible or invisible differences, our community authentically values each member's earthly and eternal worth. We refute ignorance and isolation and embrace deliberate and courageous engagement that exhibits Christ's commandment to love all humankind.

Learning Module Assessments Due Dates

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Module One - Logic and Proof	Discussion initial post due by day 4 of the module. Dropbox by the end of the module.							
Module Two - Sets and Functions		Discussion initial post due by day 4 of the module. Dropbox by the end of the module.						
Module Three - The Real			Both discussions					

<p>Numbers</p>			<p>initial post due by day 4 of the module.</p> <p>Dropbox by the end of the module.</p>					
<p>Module Four - Sequences</p>				<p>Discussion initial post due by day 4 of the module.</p> <p>Dropbox and Exam by the end of the module.</p>				
<p>Module Five - Limits and Continuity</p>					<p>Both discussions initial post due by day 4 of the module.</p> <p>Dropbox by the end of the module.</p>			
<p>Module Six - Differentiation</p>						<p>Discussion initial post due by day 4 of the module.</p> <p>Dropbox by the end of the module.</p>		
<p>Module Seven - Integration</p>							<p>Both discussions initial post due by day 4 of the module.</p> <p>Dropbox by the end of the module.</p>	
<p>Module Eight - Infinite Series</p>								<p>Discussion initial post due by day 4 of the module.</p> <p>Dropbox and Exam</p>

by the end
of the
module.

Module Outlines

Module One Outline

Title	Type	Due Dates	Estimated Time	Points
1.1 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
1.2 Chapter One Homework	Dropbox	End of module.	12 hours	120
Totals			14 hours*	140

Outline

Title	Type	Due Dates	Estimated Time	Points
2.1 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
2.2 Chapter Two Homework	Dropbox	Due by the end of the module.	9 hours	70
Totals			11 hours*	90

Outline

Title	Type	Due Dates	Estimated Time	Points
3.1 Mathematical Connection	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	1 hour	10
3.2 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
3.3 Chapter Three Homework	Dropbox	End of Module.	9 hours	70
Totals			12 hours*	100

Outline

Title	Type	Due Dates	Estimated Time	Points

4.1 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
4.2 Chapter Four Homework	Dropbox	Due by the end of the module.	9 hours	70
4.3 Exam I	Exam	Due by the end of the module.	5 hours	100
Totals			16 hours*	190

Outline

Title	Type	Due Dates	Estimated Time	Points
5.1 Mathematical Connection	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	1 hour	10
5.2 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
5.3 Chapter Five Homework	Dropbox	Due by the end of the module.	9 hours	70
Totals			12 hours*	100

Outline

Title	Type	Due Dates	Estimated Time	Points
6.1 Proof Critique	Discussion	Initial post due by day 4 of module. Two follow-up responses due at end of module.	2 hours	20
6.2 Chapter Six Homework	Dropbox	Due by the end of the module.	9 hours	70
Totals			11 hours*	90

Outline

Title	Type	Due Dates	Estimated Time	Points
7.1 Mathematical Connection	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	1 hour	10
7.2 Proof Critique	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	20
7.3 Chapter Seven Homework	Dropbox	Due by the end of the module.	9 hours	70
Totals			12 hours*	100

Outline

Title	Type	Due Dates	Estimated Time	Points
8.1 Proof Critique	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	20
8.2 Chapter Eight Homework	Dropbox	Due by the end of the module.	9 hours*	70
8.3 Exam II	Dropbox	Due by the end of the module.	5 hours	100
End of Course Survey	Survey/Quiz	Due by the end of the module.	--	10 extra credit
Totals			16 hours*	190

Course Assignments

TOTALS	104 hours*	1000
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* These timings are based on estimations of average times to complete each assignment. Actual assignment completion times will vary.

Grading Scale

Grade	Quality Points Per Credit	Percentage	Score
A	4.0	95%-100%	950-1000
A-	3.7	92%-94.9%	920-949
B+	3.3	89%-91.9%	890-919
B	3.0	85%-88.9%	850-889
B-	2.7	82%-84.9%	820-849
C+	2.3	79%-81.9%	790-819
C	2.0	75%-78.9%	750-789
C-	1.7	72%-74.9%	720-749
D+	1.3	69%-71.9%	690-719
D	1.0	65%-68.9%	650-689

F	0.0	0%–64.9%	0–649
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Grading Policies

Your grading policy for your course is dependent on your school and program. Your grading policies can be found in the IWU Catalog. <http://www.indwes.edu/catalog/1886.htm>

Letter Grade Equivalencies

Grade	Description of Work
A	Clearly stands out as excellent performance. Has unusually sharp insights into material and initiates thoughtful questions. Sees many sides of an issue. Articulates well and writes logically and clearly. Integrates ideas previously learned from this and other disciplines. Anticipates next steps in progression of ideas. Example "A" work should be of such nature that it could be put on reserve for all cohort members to review and emulate. The "A" cohort member is, in fact, an example for others to follow.
B	Demonstrates a solid comprehension of the subject matter and always accomplishes all course requirements. Serves as an active participant and listener. Communicates orally and in writing at an acceptable level for the degree program. Work shows intuition and creativity. Example "B" work indicates good quality of performance and is given in recognition for solid work; a "B" should be considered a good grade and awarded to those who submit assignments of quality less than the exemplary work described above.
C	Quality and quantity of work in and out of class is average. Has marginal comprehension, communication skills, or initiative. Requirements of the assignments are addressed at least minimally.
D	Quality and quantity of work is below average. Has minimal comprehension, communication skills, or initiative. Requirements of the assignments are addressed at below acceptable levels.
F	Quality and quantity of work is unacceptable and does not qualify the student to progress to a more advanced level of work.

Expectations, Policies, and Important Student Information

School/Division	Link
DeVoe School of Business Division of Liberal Arts School of Services and Leadership	View School/Division Expectations, Policies, and Student Information
School of Educational Leadership	View School/Division Expectations, Policies, and Student Information
Wesley Seminary @ IWU	View School/Division Expectations, Policies, and Student Information
Nursing - Undergraduate	View School/Division Expectations, Policies, and Student Information
Nursing - Graduate	View School/Division Expectations, Policies, and Student Information