

Syllabus  
Indiana Wesleyan University

MATH-503: Advanced Calculus – Online Course

Session dates: 1/21/19 – 3/17/19

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### Course Description

This course is an advanced multivariate treatment of calculus for the mature student of mathematics. Course content will include advanced treatment of differentiation and integration as well as advanced topics including Fourier Series and special functions. Prerequisite: A bachelor's degree with a Mathematics major or must be state certified (in any state) to teach Mathematics at a secondary school level.

**Credit Hours:** 3 **Prerequisite**

**Courses:** None

**Prerequisite Skills and Knowledge:** Multivariate Calculus and Familiarity with Vector Analysis including Dot Product (Inner Product) and Cross Product (Vector Product)

### Course Outcomes

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

1. Compare different coordinate systems
2. Solve Complicated Optimization Problems using Lagrange Multipliers
3. Evaluate Derivative of Integrals using Leibnitz's Rule
4. Evaluate Iterated Integrals including Changing Coordinates
5. Solve Advanced Integral Problems with Vector Integral Theorems (Green, Stokes, Divergence)
6. Develop Systems of Orthogonal Functions with Emphasis on Fourier Series
7. Demonstrate Familiarity (and some Mastery) of Important Special Functions (e.g. Gamma Function)

### Course Textbook

Kaplan, W. (2003). Advanced Calculus (5th ed.). Boston, MA: Pearson Education.

### 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.

## Grading Scale

Grade	Quality Points Per Credit	Percentage	Score
<b>A</b>	4.0	95%–100%	950–1000
<b>A-</b>	3.7	92%–94.9%	920–949
<b>B+</b>	3.3	89%–91.9%	890–919
<b>B</b>	3.0	85%–88.9%	850–889
<b>B-</b>	2.7	82%–84.9%	820–849
<b>C+</b>	2.3	79%–81.9%	790–819
<b>C</b>	2.0	75%–78.9%	750–789
<b>C-</b>	1.7	72%–74.9%	720–749
<b>D+</b>	1.3	69%–71.9%	690–719
<b>D</b>	1.0	65%–68.9%	650–689
<b>F</b>	0.0	0%–64.9%	0–649

## 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.

## Letter Grade Equivalencies

Grade	Description of Work
<b>A</b>	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>B</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.
<b>C</b>	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.
<b>D</b>	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.
<b>F</b>	Quality and quantity of work is unacceptable and does not qualify the student to progress to a more advanced level of work.

#### Course Module Summary

Module	Discussion	Assignment	Test/Project	Total Points
<b>Module One</b>	2/30	2/70		100
<b>Module Two</b>	2/30	3/105		135
<b>Module Three</b>	1/20	2/70		90
<b>Module Four</b>	2/30	2/70		100
<b>Module Five</b>	1/20	2/70	1/115	205
<b>Module Six</b>	2/30	2/70		100
<b>Module Seven</b>	2/30	2/70		100
<b>Module Eight</b>	1/20	1/35	1/115	170
<b>Course Totals</b>	<b>13/210</b>	<b>16/560</b>	<b>2/230</b>	<b>1000</b>

\* Number of Activities/Sum Point Totals. These timings are based on estimations of average times to complete each assignment. Actual assignment completion times will vary.

### Module One Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>1.1 Biblical Wisdom</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	10
<b>1.2 Module One Exercises</b>	Dropbox	By the end of the module.	7 hours	70
<b>1.3 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>Totals</b>			<b>12 hours</b>	<b>100</b>

### Module Two Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>2.1 Biblical Wisdom</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	10
<b>2.2 Module Two Exercises</b>	Dropbox	By end of the module.	11 hours	105
<b>2.3 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>Totals</b>			<b>15 hours</b>	<b>135</b>

### Module Three Outline

Assignments	Type	Due Date	Estimated Time*	Points
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<b>3.1 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>3.2 Module Three Exercises</b>	Dropbox	By the end of the module.	7 hours	70
<b>Totals</b>			<b>10 hours</b>	<b>90</b>

#### Module Four Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>4.1 Biblical Wisdom</b>	Discussion	Initial post due by the middle of the module. Two responses due by the end of the module.	2 hours	10
<b>4.2 Module Four Exercises</b>	Dropbox	Due by the end of the module.	7 hours	70
<b>4.3 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>Totals</b>			<b>12 hours</b>	<b>100</b>

#### Module Five Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>5.1 Test 1</b>	Dropbox	By the end of the module.	5 hours	115
<b>5.2 Module Five Exercises</b>	Dropbox	By the end of the module.	7 hours	70
<b>5.3 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>Totals</b>			<b>15 hours</b>	<b>205</b>

## Module Six Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>6.1 Biblical Wisdom</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	10
<b>6.2 Module Six Exercises</b>	Dropbox	By end of the module.	7 hours	70
<b>6.3 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>Totals</b>			<b>12 hours</b>	<b>100</b>

\*These times are only estimates. Actual assignment completion times will vary.

## Module Seven Outline

Assignments	Type	Due Date	Estimated Time*	Points
<b>7.1 Biblical Wisdom</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	2 hours	10
<b>7.2 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>7.3 Module Seven Exercises</b>	Dropbox	By end of the module.	7 hours	70
<b>Totals</b>			<b>12 hours</b>	<b>100</b>

## Module Eight Outline

Assignments	Type	Due Date	Estimated Time*	Points
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<b>8.1 Final Exam</b>	Dropbox	Due by the end of the module.	5 hours	115
<b>8.2 Discussion</b>	Discussion	Initial post due by the fourth day of the module. Two responses due by the end of the module.	3 hours	20
<b>8.3 Module Eight Exercises</b>	Dropbox	Due by the end of the module.	4 hours	35
<b>8.4 End of Course Survey</b>	Dropbox	Due by the end of the module.	30 minutes	10 extra credit
<b>Totals</b>			<b>12 hours</b>	<b>170</b>
<b>Course Totals</b>			<b>100:30 hours</b>	<b>1000</b>

#### Pacing Guide

- MOD 1 is due by the end of Week 1.
- MOD 2 is due by the end of Week 2.
- MOD 3 is due by the end of Week 3.
- MOD 4 is due by the end of Week 4.
- MOD 5 is due by the end of Week 5.
- MOD 6 is due by the end of Week 6.
- MOD 7 is due by the end of Week 7.
- MOD 8 is due by the end of Week 8.