Kolbe Academy
Home School

HIGH SCHOOL
Calculus
Foerster Calculus: Concepts and Applications

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♦ SYLLABUS ♦

Calculus
High School

COURSE TITLE: Calculus

COURSE TEXTS:

- *Calculus: Concept and Applications*, Paul A. Foerster, © 2010
- Solutions Manual, Optional

COURSE MATERIALS:

- Programmable Graphing Calculator, preferably TI-83 or TI-84 model (required)
- Calculator Programs – download at www.keymath.com, scroll down, and click on Calculus
- Not available from Kolbe- An AP Calculus prep book for students interested in taking either AP exam.

COURSE DESCRIPTION:

This course plan includes a one year course (10 credits) in high school Calculus. The Kolbe Honors Calculus I and II (H) course prepares the student for the AP Calculus BC exam, which typically gives Calculus I and II credit at many colleges and universities. The Kolbe Core Calculus (K) course prepares the student for the AP Calculus AB exam, which typically gives Calculus I credit at most colleges and universities. (see each university's AP policy for credits)

The Kolbe Honors (H) track, although up to the parent's discretion, is recommended for students who have achieved one of the following: a "A" or better in Algebra II/Trig (H), an A in PreCalculus (K), or a "B+" in PreCalculus (H). All students pursuing honors should expect to find the content and pace of the coursework challenging and should be sure to allot extra time for their studies.

The Kolbe Core (K) track is recommended for students who have achieved one of the following: a "B" or better in Algebra II/Trig (H), or successful completion of PreCalculus (K or H).

SCOPE AND SEQUENCE:

Kolbe Core Calculus (K)

1. Limits, Derivatives, and Integrals
2. Properties of Limits
3. Derivatives, Antiderivatives, and Indefinite Integrals
4. Products, Quotients, and Parametric Functions
5. Definite and Indefinite Integrals
6. The Calculus of Exponential and Logarithmic Functions
7. The Calculus of Growth and Decay
8. The Calculus of Plane and Solid Figures
9. Algebraic Calculus Techniques for Elementary Functions
10. The Calculus of Motion – Averages, Extremes and Vectors

Kolbe Honors Calculus I & II (H) – all above topics plus the following

11. The Calculus of Variable-Factor Products
12. The Calculus of Functions Defined by Power Series

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DIPLOMA REQUIREMENTS:

Summa Cum Laude diploma candidates are required to follow either the Kolbe Core course (K) or Kolbe Honors course (H) track outlined in this Calculus course plan if 40 credits of math have not already been earned toward graduation. ***Magna Cum Laude*** and ***Standard*** diploma candidates may choose to pursue the (H) or (K) designation, but are not required to do so, and instead have the option of altering the course plan as they choose. ***Summa*** students must complete 4 years (40 credits) of mathematics during their high school course of study including Algebra I, Geometry, Algebra II, and Pre-Calculus (or higher). ***Magna*** students must complete 3 years of mathematics during their high school course of study including Algebra I, Geometry, and Algebra II (or higher). ***Standard*** diploma students must complete 2 years of mathematics including Algebra I. Please see below for specific course titles, semester reporting requirements and transcript designations for Calculus.

REQUIRED SAMPLE WORK:

Designation*		**K**	**H**
Course Title	**Intro to Calculus**	**Calculus**	**Calculus I & II**
Semester 1	1. Any two samples of written work	1. Completed Midterm 1 Kolbe Core Calculus Exam. 2. Completed Semester 1 Kolbe Core Calculus Exam.	1. Completed Midterm 1 Kolbe Honors Calculus Exam. 2. Completed Semester 1 Kolbe Honors Calculus Exam.
Semester 2	1. Any two samples of written work	1. Completed Midterm 2 Kolbe Core Calculus Exam. 2. Completed Semester 2 Kolbe Core Calculus Exam.	1. Completed Midterm Kolbe Honors Calculus Exam. 2. Completed Semester 2 Kolbe Honors Calculus Exam.

***Designation refers to designation type on transcript. K designates a Kolbe Academy Core course. H designates a Kolbe Academy Honors course.**

If the student wishes to have the course distinguished on the transcript with a (K) as a Kolbe Academy Core course or with an (H) as a Kolbe Academy Honors course, please be sure to send the correct exams and components each semester for verification as specified above. **If no designation on the transcript is desired, parents may alter the lesson plan and any written sample work is acceptable to receive credit for the course each semester.** If you have any questions regarding what is required for the (K) or (H) designations or diploma type status, please contact the academic advisory department at 707-255-6499 ext. 5 or by email at advisors@kolbe.org.

COURSE PLAN "AT A GLANCE" OUTLINE:

Core Calculus (K)

Semester 1

Weeks 1-8: Chapters 1, 2 & 3
Omit Section 1-5
Week 9: Midterm 1 Exam
Weeks 10-17: Chapters 4 & 5
Omit Section 4-7
Week 18: Semester 1 Exam

Semester 2

Weeks 1-8: Chapters 6 & 7
Omit Section 7-5 & 7-6
Week 9: Midterm 2 Exam
Weeks 10-17: Chapters 8, 9 & 10
Omit Sections 8-4 to 8-7, 9-4, 9-5, 9-7, 9-9, 9-10, & 10-6
Week 18: Semester 2 Exam

Honors Calculus I & II (H)

Semester 1

Weeks 1-8: Chapters 1, 2, 3 & 4
Omit Section 1-5
Week 9: Midterm 1 Exam
Weeks 10-17: Chapters 5, 6 & 7
Week 18: Semester 1 Exam

Semester 2

Weeks 1-8: Chapters 8 & 9
Omit Section 8-6
Week 9: Midterm 2 Exam
Weeks 10-17: Chapters 10, 11 & 12
Omit Sections 11-3 to 11-6
Week 18: Semester 2 Exam

Please note that many chapters are not covered in their entirety. Be sure to refer to the course plan that follows for specific guidance.

COURSE PLAN METHODOLOGY:

The ***Quick Review*** problems that appear at the beginning of the exercises with each lesson are meant to be completed in 5 minutes or less. Students should **not** write out all the steps neatly for these problems, but instead try to quickly write down the answer and move on. These problems are meant to recall concepts learned in previous sections, chapters or math courses. Overall, these problems will help a student to think quickly, a skill that is useful in taking standardized tests, and will assist the student in remembering useful mathematical tools learned in the past. These problems can be used as short, timed quizzes if desired.

A selection of exercises from the ***Problem Sets*** will be assigned with each section for the student to complete. A sufficient number of problems have been carefully chosen to help the student become proficient in a topic and prepare them for the Kolbe exams and specific AP Calculus exam. The author's intent was not to have students complete all of the problems in the book, but to have a diverse number of problems available to the teacher. Most odd numbered problems are answered in the back of the student text. It is advisable for students to check their work as they go along in an assignment to be sure that they have understood the methodology of the section. The solution manual may be used by the student to check any even numbered problems. If additional work is needed, students may want to pick a few of the even numbered problems for further practice.

At the end of every chapter, a ***Chapter Review*** is assigned. The ***Chapter Test*** that appears at the end of each chapter is assigned during the review and/or test weeks to help prepare the student for the Kolbe Exams. However, parents may opt to give these Chapter Tests immediately following the completion of a chapter if they

would like to include more test grades in the student's overall grade. Be sure to review which questions are assigned from each test as not all Chapter Tests are always completed in their entirety. The Chapter Test questions, if used as a test, should be completed in less than one hour.

Four Exams are included at the end of the course plan. Please be sure to utilize the correct exams for your student. There are two sets – a set for students seeking our Kolbe Core (K) designation and a set for those seeking our Honors (H) designation. Each exam has two "sittings", Part 1 which does not allow the use of the graphing calculator and Part 2 which does allow it. Students should turn in Part 1 before being given Part 2. One hour for each sitting, or two hours total, should be sufficient for completion of the exams. All questions are taken from the test bank provided by the author.

It follows then, that students are expected to be utilizing a programmable ***Graphing Calculator.*** The College Board allows graphing calculators on the AP Calculus exams (both AB & BC) saying, "The use of a graphing calculator is considered an integral part of the AP Calculus course, and is permissible on parts of the AP Calculus Exams. Students should use this technology on a regular basis so that they become adept at using their graphing calculators. Students should also have experience with the basic paper-and-pencil techniques of calculus and be able to apply them when technological tools are unavailable or inappropriate." The Kolbe Academy exams are set up specifically to hone testing skills in both the calculator and non-calculator portions of the AP exams. Kolbe Academy has traditionally suggested the use of the TI-83 or TI-84 graphing calculator models. If a program is needed for a calculator, students may download them by going to www.keymath.com, scrolling down, and clicking on Calculus. The programs are available for free to students.

Kolbe Academy Home School | ♦ COURSE PLAN ♦ | Calculus High School

♦♦♦ FIRST SEMESTER ♦♦♦

WEEK 1

Please note that there is not a large section of precalculus review in this course. Instead, precalculus concepts are reviewed on an "as needed" basis, typically in the "Quick Review" problems. This allows the student to "jump right in" to Calculus. Students will need to program their calculators to complete the assignments in Section 1-4. They may download programs for free at www.keymath.com and by clicking on Calculus.

Core Calculus (K)		Honors Calculus I & II (H)	
♦♦♦ Chapter 1: Preliminary Information ♦♦♦		♦♦♦ Chapter 1: Preliminary Information ♦♦♦	
1-1	Read Section 1-1. Do problems 1 & 2.	1-1	Read Section 1-1. Do problems 1 & 2.
1-2	Read Section 1-2. Do Q1-Q10; 1-29 (odd)	1-2	Read Section 1-2. Do Q1-Q10; 1-29 (odd)
1-3	Read Section 1-3. Do Q1-Q10; 1-11 (odd, 12-14 (all)	1-3	Read Section 1-3. Do Q1-Q10; 1-11 (odd, 12-14 (all)
1-4	Read Section 1-4. Do Q1-Q10; 1-5 (odd), 7-13 (odd). For problem 5, be sure to download TRAPRULE onto your calculator. It is located at www.keymath.com.	1-4	Read Section 1-4. Do Q1-Q10; 1-5 (odd), 7-13 (odd). For problem 5, be sure to download TRAPRULE onto your calculator. It is located at www.keymath.com.
1-6	Do problems R1-R4. Students will be assigned the Chapter Test during Week 8 to prepare for the Midterm 1 Exam.	1-6	Do problems R1-R4. Students will be assigned the Chapter Test during Week 8 to prepare for the Midterm 1 Exam.
		♦♦♦ Chapter 2: Properties of Limits ♦♦♦	
		2-1	Read Section 2-1. Do problems 1-3.

Notes

WEEK 2

Core Calculus (K)		Honors Calculus I & II (H)	
Two days should be spent on Section 2-3.		2 days each should be spent on Sections 2-3 & 2-4.	
♦♦♦ Chapter 2: Properties of Limits ♦♦♦		♦♦♦ Chapter 2: Properties of Limits ♦♦♦	
2-1	Read Section 2-1. Do problems 1-3.	2-2	Read Section 2-2. Do Q1-Q10; 1-27 (odd)
2-2	Read Section 2-2. Do Q1-Q10; 1-27 (odd)	2-3	Read Section 2-3. Do Q1-Q10; 1-23 (odd)
2-3	Read Section 2-3. Do Q1-Q10; 1-23 (odd)	2-4	Read Section 2-4. Do Q1-Q10; 1-45 (odd)
2-4	Read Section 2-4. Do Q1-Q10; 1-29 (odd)		

Notes

WEEK 3

Core Calculus (K)	Honors Calculus I & II (H)
Students should spend two days on Section 2-6.	Section 3-1 can be done the same day as 2-7.

2-4	Do problems 31-45 (odd).	**2-5**	Read Section 2-5. Do Q1-Q10; 1-13 (odd), 12, 14
2-5	Read Section 2-5. Do Q1-Q10; 1-13 (odd), 12, 14	**2-6**	Read Section 2-6. Do Q1-Q10; 1-9 (odd), 12, 13
2-6	Read Section 2-6. Do Q1-Q10; 1-5 (day 1) On day 2, do problems 8-14 (all)	**2-7**	Read Section 2-7. Do problems R1-R6.
2-7	Read Section 2-7. Do problems R1-R6.	Students will be assigned the Chapter Test during Week 8 as review for the Midterm exam.	
Students will be assigned the Chapter Test during Week 8 as review for the Midterm exam.		♦♦♦ **Chapter 3** ♦♦♦ **Derivatives, Antiderivatives, and Indefinite Integrals**	
		3-1	Do problems 1-7 (all)
		3-2	Read Section 3-2. Do Q1-Q10, 1, 2, 3-9 (odd), 10, 11-19 (odd), 20
		3-3	Read Section 3-3. Do Q1-Q10, 1-13 (odd), 14-16 (all)

Notes

WEEK 4

Core Calculus (K)		**Honors Calculus I & II (H)**	
♦♦♦ **Chapter 3** ♦♦♦ **Derivatives, Antiderivatives, and Indefinite Integrals**		Students should take 2 days for Section 3-4.	
Students should take 2 days for Section 3-4.		**3-4**	Read Section 3-4. Do Q1-Q10, 1-23 (odd) on day 1. On day 2, do problems 29-33 (odd) 34, 39, 40
3-1	Do problems 1-7 (all)		Note the difference between the derivative of a constant function and the limit of a constant function (described at the bottom of page 87).
3-2	Read Section 3-2. Do Q1-Q10, 1, 2, 3-9 (odd), 10, 11-19 (odd)	**3-5**	Read Section 3-5. Do Q1-Q10, 1-11 (odd), 12-14 (all), 15-21 (odd)
3-3	Read Section 3-3. Do Q1-Q10, 1-13 (odd), 14-16 (all)	**3-6**	Read Section 3-6. Do 1-7 (all)
3-4	Read Section 3-4. Do Q1-Q10, 1-23 (odd) on day 1. On day 2, do problems 29-33 (odd) 34, 39, 40	**3-7**	Read Section 3-7. Do Q1-Q10, 1, 2, 3-11 (odd).
	Note the difference between the derivative of a constant function and the limit of a constant function (described at the bottom of page 87).		

Notes