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MATH 160
Survey of Calculus

Course Guide

Independent Study in Idaho

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Mathematics 160
Survey of Calculus

University of Idaho
4 Semester-Hour Credits

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Math 160: Survey of Calculus

4 Semester-Hour Credits: UI

Welcome!

Whether you are a new or returning student, welcome to the Independent Study in Idaho (ISI) program. Below, you will find information pertinent to your course including the course description, course materials, course objectives, as well as information about lessons, exams, and grading.

Policies and Procedures

Refer to the ISI website at **www.uidaho.edu/isi** and select *Students* for the most current policies and procedures, including information on setting up accounts, student confidentiality, exams, proctors, transcripts, course exchanges, refunds, academic integrity, library resources, and disability support and other services.

Course Description

Overview of functions, and graphs, derivatives, integrals, exponential and logarithmic functions, functions of several variables and differential equations. Primarily for students who need only one semester of calculus, such as students in business, or architecture. Prerequisite: sufficient score on SAT, ACT, or math placement test, or Math 137 Algebra with Applications with a C or better, or Math 143 with a C or better. *Required test scores can be found here: www.uidaho.edu/registrar/registration/placement/. UI students: Polya Math Center unavailable for ISI students; carries no credit after Math 170; General education: Mathematics.*

Recommended: non-graphing calculator
20 graded assignments, 8 self-study assignments, 5 proctored exams
Be advised, exams for this course are sent one-at-a-time once appropriate lessons have been graded.

Students may submit up to 2 assignments per week. Before taking exams, students MUST wait for grades and feedback on assignments, which may take up to three weeks after date of receipt by the instructor.

ALL assignments and exams must be submitted to receive a final grade for the course.

Course Materials

Required Course Materials

- Goldstein, Larry J., Lay, David C.; and Schneider, David I. *Brief Calculus & Its Applications.* 10th ed. Upper Saddle River: Prentice-Hall, 2004. ISBN: 9780131602229.

Supplemental Materials (optional, but recommended):

- Goldstein, Larry J., Lay, David C.; and Schneider, David I. *Study Guide & Selected Solutions Manual. Brief Calculus & Its Applications.* 10th ed. Upper Saddle River: Prentice-Hall, 2004. ISBN: 9780130466228
- **Texas Instrument TI-30X IIS 2-Line Scientific Calculator ONLY**. No other calculators allowed for test-taking (see image to right).

Course Delivery

All ISI courses are delivered through Canvas, an online management system that hosts the course lessons and assignments and other items that are essential to the course. Upon registration, the student will receive a Registration Confirmation Email with information on how to access ISI courses online.

Course Introduction

It is assumed that the student taking this course has already mastered the essential elements of algebra and Euclidean geometry. An excellent algebra review is given in Chapter 0 of the text, but basic geometric concepts such as point, line, plane, and area formulas for plane figures such as circles, rectangles, and triangles are taken for granted. Trigonometric concepts such as sine and cosine are not used at all in this course. A prior understanding of exponential and logarithmic functions is desirable, although these topics are introduced under the assumption that the student has had little or no prior exposure to them.

The calculus introduced here is at an intuitive level. Essential definitions and postulates are given as in any beginning calculus course, but theorems are stated without formal proof. This course stresses application. Since the ability to immediately apply calculus, especially in the areas of business and economics, is the primary objective of the course, problem-solving will be stressed in both the homework and on the examinations.

Course Objectives

- The objective of this course is to learn about integral calculus and its applications, with a concentration on business applications.
- An understanding of the applications of integral calculus will strengthen the student's ability to tackle problems analytically.
- Although the following is not qualitative, it illustrates approximately what type of work is expected for the letter grades A, B, and C. Students earning an "A" will have completed all lessons (this includes self-study lessons) in an exceptional fashion. In addition they may have exhibited few algebraic errors in their work, used proper notation throughout the course, properly labeled all graphs, and mastered each of the topics covered by the lessons. Students earning a "B" will have successfully completed all lessons. They may have exhibited some algebraic errors in their work, with improvements made along the way in algebraic skills, notation, and graphs, and have mastered almost all of the topics covered by the lessons. Students earning a "C" will have satisfactorily worked on all the lessons and shown the ability to improve their algebraic skills and demonstrated extensive knowledge of each of the topics covered by the lessons.

Lessons

Each lesson includes the following components:

- A reading assignment
- An introduction
- Comments
- A written assignment
- A checklist of topics

You will be required to show all work necessary to solve each problem or you will receive no credit.

Some lessons in this course are self-study. The exercises in these lessons are for you to see how well you have mastered the material in the text and this study guide. Read the assignments carefully before beginning the self-study questions; answer them to the best of your ability, and then check your answers in the supplement to the textbook. Although these lessons will not be submitted for grading, the material may be covered in the examinations. Do your best and do not skip these important lessons.

Use of the Study Guide

Each lesson begins with a reading assignment followed by a brief introduction. Sections of the text not specifically mentioned should be omitted. It is important that you thoroughly understand the material presented in these reading assignments, particularly the examples, prior to proceeding with the lesson. Following the introduction is a section titled Comments. The comments section of a lesson may vary in length from a few sentences to several pages with worked examples.

Practice assignments are given next. These consist primarily of the odd-numbered exercises. There are some detailed solutions to practice exercises in the text's supplement, *Study Guide & Selected Solutions Manual, Brief Calculus & Its Applications*. In addition, you will find a few similar problems worked out in detail in this study guide.

The written assignment is the last part of each lesson. This consists primarily of the even-numbered exercises. Please note that it is your responsibility to provide the work and detail necessary to obtain and justify your solutions.

Study Hints:

- Keep a copy of every lesson submitted.
- Complete all lessons including the reading and self-study lessons.
- Set a reasonable schedule allowing for completion of the course one month prior to your desired deadline.
- Use proper notation and include scales on all graphs in the lessons. Graphs must be completed on graph paper. (graph paper can be found online and printed for free)
- Expect this course to take approximately four months, but possibly longer, assuming you work on it every day.
- Set a schedule allowing for completion of the course one month prior to your desired deadline. (An *Assignment Submission Log* is provided for this purpose.)

Exams

- You must wait for grades and comments on lessons prior to taking each subsequent exam.
- For your instructor's exam guidelines, refer to the Exam Information sections in this study guide.

At the appropriate times, you will be directed to take an examination before proceeding with additional lessons. All examinations must be taken without the use of the text, this study guide, or notes of any sort (you may use a calculator, **but not a graphing calculator**). Therefore, the concepts, definitions, theorems, etc., required to do the assignments must be committed to memory. You will not be asked to state a definition verbatim or to prove a theorem, but you will be expected to use them in solving both theoretical and application-type problems. Don't panic! You will find the rules of calculus are very few and quite easy to use. The typical student has much more difficulty remembering the fundamentals of algebra than he or she does remembering the fundamentals of calculus learned here.

Each of the four 2-hour examinations will cover only that material since the last examination. For the most part, 80 to 90 percent of each examination will consist of questions similar to those in the assigned problems. The remaining test questions will see if you can apply your newfound knowledge to new situations.

The final examination will be comprehensive, and you will be given three hours to complete it. The problems will be similar in structure and type to the two-hour examinations.

It should be stressed that your success on the two-hour examinations, and on the final, will depend on how diligently you work through all the lessons, including the practice problems. **It is recommended that you**

wait until the lessons are returned before taking the examination over a particular section. This way you are sure that procedures used to solve the problems are correct. You have only one chance at each exam, so be sure that you are prepared and have all the lessons completed and returned to you.

See *Grading* for specific information on exams, points, and percentages.

Proctor Selection/Scheduling Exams

All exams require a proctor. At least 2 weeks prior to taking your first exam, submit the completed *Proctor/Exam Request Form* (available at uidaho.edu/isi, under *Forms*) to the ISI office. ISI mails all exams directly to the proctor after receiving the *Proctor/Exam Request Form*. You must schedule the examination time with your proctor prior to each exam. The proctor administers the exam and returns it to the ISI office.

Grading

The course grade will be based upon the following considerations:
The grading for this course will be based on 800 points, broken down as follows:

Assignments (20)	200 points: (10 points each)
Examinations (4)	400 points (100 points each)
Final Examination (Comprehensive)	200 points
Total	800 points possible

Grades will be assigned according to the following:

A:	720 to 800 points	90%+
B:	640 to 719 points	80%+
C:	560 to 639 points	70%+
D:	480 to 559 points	60%+
F:	479 or fewer points	below 60%

The final course grade is issued after **all** lessons and exams have been graded.

Acts of academic dishonesty, including cheating or plagiarism are considered a very serious transgression and may result in a grade of F for the course.

About the Course Developer

This course was developed by Dr. Dusty E. Sabo, an Associate Professor of Mathematics at Southern Oregon University in Ashland, Oregon. In 1996 he obtained his Ph.D. from the University of Idaho where he studied combinatorial geometry under the direction of Professor Mark J. Nielsen. He has worked as an instructor for Independent Study in Idaho since 1994.

Contacting Your Instructor

Instructor contact information is posted in the ***Course Rules*** document on your Canvas site

Assignment Submission Log

Lesson	Chapter	Reading	Written Assignment	Date Submitted
1	0	Sections 0.1, 0.2	assigned problems	self-study
2	0	Sections 0.3, 0.4, 0.5	assigned problems	____
3	1	Sections 1.1, 1.2	assigned problems	____
4	1	Sections 1.3, 1.4	assigned problems	____
5	1	Sections 1.5, 1.6	assigned problems	____
6	1	Sections 1.7, 1.8	assigned problems	____
7	0, 1	Review	assigned problems	self-study
It is time to make arrangements with your proctor to take Exam 1.				
8	2	Sections 2.1, 2.2	assigned problems	self-study
9	2	Sections 2.3, 2.4	assigned problems	____
10	2	Section 2.5	assigned problems	____
11	2	Section 2.6	assigned problems	____
12	2	Section 2.7	assigned problems	____
13	3	Sections 3.1, 3.2	assigned problems	____
14	2, 3	Review	assigned problems	self-study
It is time to make arrangements with your proctor to take Exam 2.				

15	4	Sections 4.1, 4.2	assigned problems	____
16	4	Section 4.3	assigned problems	____
17	4	Sections 4.4, 4.5	assigned problems	____
18	4	Section 4.6	assigned problems	____
19	5	Section 5.1	assigned problems	____
20	5	Section 5.2	assigned problems	self-study
21	4, 5	Review	assigned problems	self-study
It is time to make arrangements with your proctor to take Exam 3.				
22	6	Section 6.1	assigned problems	____
23	6	Section 6.3	assigned problems	____
24	6	Section 6.4	assigned problems	self-study
25	6	Section 6.6	assigned problems	____
26	7	Sections 7.1, 7.2	assigned problems	____
27	7	Sections 7.3, 7.4	assigned problems	____
28	6, 7	Review	assigned problems	self-study
It is time to make arrangements with your proctor to take Exam 4.				
It is time to make arrangements with your proctor to take the Final Exam.				

Lesson 1
Self-Study: Preliminary Concepts

Do not submit this lesson for grading. After carefully working through the following questions, check your answers with the solutions found in the textbook.

Reading Assignments

Chapter 0, Section 0.1, pp. 3-15; Section 0.2, pp. 18-25.

Introduction

This course begins with a review of some of the fundamental concepts needed for the study of calculus. This first lesson explores the concept of a function, functional notation, and the graph of a function.

Comments

These sections briefly review the concept of a function. The importance of being able to use and understand function notation throughout this course cannot be overstated. In particular, note at the bottom of page 7 the use of the convention in higher mathematics that if the domain of a function is not explicitly stated, it is implied to "consist of all numbers for which the formula defining the function makes sense." For this class's needs, domains of the functions will always be restricted to subsets of the real numbers. For example, *making sense* means that mathematically excluded from our domains are numbers yielding division by zero, or numbers requiring the square root of negative numbers. Make these exclusions, as only on occasion will they be explicitly stated. *Making sense* means even more with regard to word problems where mathematical modes are created for real-world situations. Restrict domains not only to numbers that make mathematical sense, but also to those numbers that are reasonable in the context of the problem.

Frequently, numbers that make mathematical sense do not make sense as the solutions to problems which represent real-life situations, such as determining optimal production levels in a factory. Mathematically, a formula may result in the numbers -150 and 200. Eliminate -150 since, in most cases, production levels are not thought of in negative terms.

In Section 0.2, pay particular attention to the discussion of linear functions. The ability to understand the algebra of straight lines is important to understanding the notion of a derivative found in calculus.

Self-Study Assignments

Section 0.1: 13, 15, 17, 19, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 47, 53 (pp. 15-17).
Section 0.2: 1, 3, 7, 9, 17, 21, 29 (pp. 26-27).

Checklist Lesson 1

Chapter 0, Section 0.1

- Function
- Value of a function
- Domain of a function
- Graph of a function
- Vertical line test

Chapter 0, Section 0.2

Linear function
Constant function
x- and *y*-intercepts
Quadratic function
Polynomial function
Power function
Absolute value function