

MATH.1220 Management Calculus Spring 2020

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Office hours: Tuesday 9:30-10:45 and 12:30-1:20, Thursday 9:30-10:45

Text: Bittinger and Ellenbogen, **Calculus and Its Applications**, 11th edition, Pearson Education Inc. 2016; and the accompanying software MyMathLab.

Note: The loose-leaf version of the text and MyMathLab are packaged together at a reduced price. Online versions of the student solution manual and text are available with MyMathlab. The online student solutions manual (odd numbered problem solutions) is under the Chapter Contents tab and the online text is under the Multimedia Library tab. The hard copy student solution manual will be available separately at the bookstore.

Goals and objectives: This applied calculus course is a reform calculus approach for non science students. Emphasis will be given to a graphical understanding of calculus concepts, especially with regard to applications. A solid foundation in Pre-Calculus Mathematics is assumed.

The strategies will consist of business and economics related applications to the mathematical concepts as they are developed through graphical, numeric and analytic procedures. The primary objectives are:

- Differential calculus:- Slopes of lines will be viewed graphically and limiting cases examined to understand the meaning of a derivative. Relative maximum and minimum will be identified and applications developed for revenue, cost and profit functions. For optimization problems, graphical and numeric techniques will be used to help identify solutions. Elasticity of demand applications will also be examined. In all cases, students will be responsible for analytic methods of solution.
- Exponential and log functions:- Natural logarithm and growth/decay functions will be graphed, trends discussed and applications developed.
- The development of integration techniques as an antidifferentiation process along with applications of integration to economics.

Technology will be used as necessary to model data with least squares regression procedures and an emphasis will be placed on problem solving.

Grading policy: MyMathLab online homework will be assigned, due approximately weekly and will account for 25% of the grade. To get a question correct, MML allows several attempts per question and unlimited attempts to request a similar question were enabled. Additional text problems are also assigned. Hard copy of the MyMathLab assignments and additional text problems with detailed mathematical explanations should be maintained by students. Any individual MML due date adjustment requires that at least 50% of the assignment be completed correctly and that written and acceptable justification for the request be supplied. There may be quizzes during the semester and assessments will be based on individual instructor preference. The quizzes will be based on material as in online MML homework and additional assigned homework as listed in the syllabus or assigned by your instructor. A missed quiz or exam results

in a **zero** grade without acceptable documentation. Each of the two exams will be worth 20% of the grade. The comprehensive two hour final examination will be worth the 25% of the grade. The final examination is common for all day MATH.1220 students. The [MAST Module 2004-2005](#) material will be used as a resource for projects. Two projects will be assigned during the course of the semester. The projects will be scored on a 0-5 scale and each project will be worth 5% of the grade. Participation in class will be recognized as an asset in final grade evaluation. Graphing calculators can be used on all exams.

Final Average:

A guideline for course grade assignment will be:

[93-100]	A
[90-93)	A-
[86-90)	B+
[81-86)	B
[77-81)	B-
[74-77)	C+
[70-74)	C
[66-70)	C-
[63-66)	D+
[56-63)	D
[0-56)	F

Note that [90-93) means a grade greater than or equal to 90 and less than 93.

Attendance policy: There will be two 75 minute meetings per week. Students are expected to attend all classes and are responsible for all material covered. Exams one and two will be given during class time. As previously stated, a missed examination or quiz will result in a **zero** grade unless prior arrangements or acceptable written documentation is provided.

Assuming eligibility, at least two weeks prior to any announced exam, arrangements must be made with the instructor for extended time. Extended time will refer to time allotted on the day of the scheduled exam. In the case of the final exam, arrangements must be made at least two weeks prior to the end of scheduled classes.

Procedures about academic integrity are described in the university catalog at <http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Academic-Integrity.aspx>. As necessary, sanctions may be imposed on any student who has committed an act of academic dishonesty. In such cases, the student will be informed within 14 days after the incident has been recognized and the provost's office will be notified within 10 days after student notification.

Technology: The TI-84 Plus Silver Edition will be used throughout the course as a visual aid for learning. While technology will be used, students are responsible for mastery of analytic procedures presented. It is expected that all students will have a TI graphing calculator.

In addition to the MyMathLab text based homework assignments, other exercises as listed will be reviewed. Review material including sample exams will be made available.

The following should serve as a guide for exam coverage. It represents sections that are included.

<u>Week</u>	<u>Sections to be covered</u>
1-2	MML #1 assigned, R6, 1.3, 1.4
3	MML #2 assigned, 1.4, 1.5, 1.6
4	MML #3 assigned, 1.6, 1.7, 2.1
5	2.1 and review, exam 1
6	MML #4 assigned, 2.2, 2.4
7	MML #5 assigned, 2.4, 2.5
8	MML #6 assigned, 2.6, 2.7
9	MML #7 assigned, 2.8, 3.1
10	review, exam 2
11	MML #8 assigned, 3.2, 3.3
12	MML #9 assigned, 3.4, 4.1
13	MML #10 assigned, 4.3, 5.1
14	Review for final exam

Assignments for MATH.1220 Management Calculus

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<u>Section</u>	<u>Topic</u>	<u>Exercises</u>
MML/R.6	TI least squares – Math Modeling	MML #1, p76:10,12 and 14(use 1 sq) 20,26(set x=0 in 2006),p88:57,58, p91:1
1.3	Average rates of Change	MML #1, p122:6,40,46,54,56
MML/1.4	Limits of Difference Quotients	MML #2, p135:21,46,48,64
1.5	Power Rule	MML #2, p145:1,21,29,49,57,61,94, 95,96
1.6	Product and Quotient Rules	MML #3, p154:25,59,61,83
1.7	Chain Rule	MML #3, p163:8,17,46,58,75
2.1	Relative max/min	MML #4, p201:3,16,20
2.2	Second derivatives and applications	MML #4, p217:10,11,12
2.4	Absolute Max/Min	MML #5, p240:5,7,22,80
2.5	Max/Min – Bus. and Econ. Applications	MML #5, p254:11,19,29,31

2.6	Marginals and Differentials	MML #6, p265:3,7,29,35,38
2.7	Elasticity of Demand	MML #6, p273:3,11,p289:51
2.8	Implicit Differentiation and Related Rates	MML #7, p279:5,7,9,35,40,44
3.1	Exponential Functions and Derivatives	MML #7, p304:47,77
3.2	Log Functions, Properties and Derivatives	MML #8, p319:33,34,37,62,92
3.3	Growth Model	MML #8, p331:22,24,30,31,45
3.4	Decay and Present Value Applications	MML #9, p343:25,30,31,32,36,45
4.1	Antidifferentiation	MML #9, p378:19,25,29,45,53
4.3	Definite Integrals	MML #10, p400:8,35,36,38,59
5.1	Consumer and Producer Surplus	MML #10, p454:11,14

Graphing Calculator Implementation

Least squares regression analysis as a tool to model data will be introduced early in the course. An example using TI-84 implementation follows.

Linear Regression

ex: Model the Dow Jones (D.J.) weekly data with a linear regression model $y = ax + b$.

a) STAT, EDIT to create data

$L_1(\text{time})$	$L_2(\text{D.J.})$	$L_1(\text{time})$	$L_2(\text{D.J.})$
1	28275	6	28400
2	28285	7	28425
3	28320	8	28450
4	28350	9	28475
5	28375	10	28490

b) Invoke the linear regression procedure by pressing STAT, CALC, then option 4 for LinReg(ax+b). The steps appear in item c below.

c) STAT, CALC, LinReg(ax+b).

d) After LinReg(ax+b) appears, we want to access the x data in list 1, the y data in list 2, and store the results in equation y_1 (To get y_1 to appear, press VARS, then Y_VARS, then 1 for Function and 1 again for y_1). The result will appear as L_1, L_2, y_1 and then press enter.

e) Next we want to turn on the STAT PLOTS. Do this by pressing 2nd STAT PLOT, option 1, on.

f) Finally to get the plot of the actual data and regression equation, press ZOOM, option 9.

g) When done, be sure to turn off plot 1 at y=screen or at STAT PLOT. If not turned off, you will not be able to graph other functions.

For newer operating systems on the TI-84, the regression procedure looks a bit different. Step d) takes on a new look. After pressing LinReg(ax+b), the TI-84 screen appears as

LinReg(ax+b)

Xlist: L_1 (L_1 is the default for x data and just press the down arrow)

Ylist: L_2 (L_2 is the default for y data and just press the down arrow)

FreqList: (just press the down arrow to bypass this option)

Store RegEQ: y_1 (repeat the procedure in step d) above to store the equation in y_1 and then press the down arrow)

Calculate: press enter (to get the results)

Regardless which operating system is used, be sure to turn on the R^2 feature. This statistic is the percentage of variance accounted for in the regression model. Values for R^2 range from zero to 1. The closer R^2 is to 1, the less error there is in the model between the actual and modeled data. To turn on this feature so that it will output when a least squares regression analysis is done, on your TI keypad type in the following:

2nd catalog-> press the down arrow until you get to DiagnosticOn->press enter twice.

This will have to be done only once.