

# QMM 241 – Business Statistics II (12723)

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**Isken Web:** <http://www.sba.oakland.edu/faculty/isken/>  
**Course Web:** Login to Moodle <http://moodle.oakland.edu/>

**Office Hours:** Th 12-1p, and by appt  
**My Office:** 317 Elliott Hall

**Class Meeting Time and Location**  
Tu, Thu 10:30a-11:45a in 202 EH

## Course Description

QMM 241 is the second of two quantitative methods courses you will take in the SBA. In QMM 241 we will explore regression, ANOVA, forecasting, and a few other topics. A primary goal of this course is to allow you to start to become a proficient business data analyst. Application and interpretation of statistical concepts will be stressed and much hands-on work will be used to help you learn and use the machinery of statistics and data analysis in the business world.

## Course Materials

**Textbook:** *Applied Statistics in Business and Economics* by Doane and Seward (4th edition). You can get by with either 3<sup>rd</sup>, 4<sup>th</sup> or 5<sup>th</sup> edition. I'll be using the 4<sup>th</sup> edition.

**Software:** We will use Excel, JMP, MegaStat (an Excel add-in), R, LearningStats, and @Risk. All of these packages are installed on all machines within the SBA.

**Course Webs:** The course website is available through Moodle (<http://moodle.oakland.edu>). It will be used for announcements, distribution of lecture notes, homework, handouts and other materials. This syllabus is available on the course web. Get used to checking it frequently.

## Course Delivery

Lectures will consist of presentation and discussion of important concepts, working of example problems, demonstrations of concepts using Excel, MegaStat or other software tools. Skeleton notes for each lecture have been posted to Moodle. The best way to cover the course material is to attend lecture and work along as we fill in the blanks in the lecture notes and solve problems together. As such, attendance in lecture is not required; rather, it is strongly encouraged. In the event a student misses a lecture, it is their responsibility to make up any material.

# Performance Evaluation

There are three components that are weighted as follows for grading purposes.

Homework, Quizzes and Lab Assignments	40%
Midterm Exam	30%
Cumulative Final Exam	30%

The following scale will be used for determining minimum final grades.

Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
0.986	4	0.886	3.5	0.796	3	0.746	2.5	0.696	2	0.646	1.5
0.966	3.9	0.866	3.4	0.786	2.9	0.736	2.4	0.686	1.9	0.636	1.4
0.946	3.8	0.846	3.3	0.776	2.8	0.726	2.3	0.676	1.8	0.626	1.3
0.926	3.7	0.826	3.2	0.766	2.7	0.716	2.2	0.666	1.7	0.616	1.2
0.906	3.6	0.806	3.1	0.756	2.6	0.706	2.1	0.656	1.6	0.606	1.1
								0.596	1		

## Homework/Lab Assignments (40%)

Consistent problem solving practice is integral to learning mathematical and statistical concepts. So, we will have a number of (~6-8) homework assignments throughout the semester. The format of these assignments will vary – some will involve “paper and pencil” but most will require computer work and submission of electronic files via Moodle. There will be explicit instructions given with each assignment explaining what is to be done and how the assignment is to be submitted. You can discuss and consult with your classmates, but each assignment must be completed and turned in individually. There will also be a few online Moodle quizzes and in-class lab work.

### Late Assignment Policy

Late assignments will be penalized 25% if you turn in an assignment anytime after 10:15am on the day that it was due. If you turn it in the day after its due you will lose 50% of the maximum score. Beyond the day after it's due, I will not accept it at all since I want to be able to post solutions two days after the assignment is due.

## Exams (60%)

The midterm exam is worth 30% and the final cumulative exam is worth 30%. The exams will focus on important concepts discussed in class and reinforced through homework assignments and practice problems.

## Ethics

Ethics is a fundamental business concept. The standards of conduct by which one's actions are judged right or wrong, honest or dishonest, fair or unfair, are called *ethics*. Please read and comply with the university's policy on academic conduct (i.e., ethical behavior). It is printed in the undergraduate catalogue. For this course, unaided individual work is expected for examinations. For individual homework assignments you may discuss problems with your classmates but everyone must do and turn in their own work.

## Tentative Schedule of Topics (see Moodle for up to date changes)

Week	DATE	TOPIC	TEXTBOOK
1	1/5/2016	Intro to QMM 241	
1	1/7/2016	RV and distribution review	Ch 5,6,7
2	1/12/2016	Review: One sample hypothesis testing	Ch 9
2	1/14/2016	Two sample hypothesis testing	
3	1/19/2016	Two sample hypothesis testing	Ch 10
3	1/21/2016	One way ANOVA	Sec 11.1,11.2,11.3
4	1/26/2016	One way ANOVA	
4	1/28/2016	Two way ANOVA	Sec 11.5,11.6
5	2/2/2016	Two way ANOVA	
5	2/4/2016	Two variable relationships	Sec 12.1,12.2,12.3
6	2/9/2016	Simple regression	Sec 12.3-12.6
6	2/11/2016	Prediction and model assessment	Sec 12.7-12.9
7	2/16/2016	Catch up and Review	
7	2/18/2016	<b>Midterm Exam</b>	
8	2/23/2016	<i>No class - Winter Break</i>	
8	2/25/2016	<i>No class - Winter Break</i>	
9	3/1/2016	Multiple linear regression	Sec
9	3/3/2016	Multiple linear regression	13.1,13.2,13.3,13.4
10	3/8/2016	Binary predictors, interactions	Sec 13.5,13.6
10	3/10/2016	Model assessment	Sec 13.7,13.8,13.9
11	3/15/2016	Time series data	Sec 14.1,14.2,14.3,14.7
11	3/17/2016	Forecasting	Sec 14.4,14.5,14.6
12	3/22/2016	ChiSquare tests and contingency tables	Sec 15.1
12	3/24/2016	Goodness of fit tests	Sec 15.2,15.5
13	3/29/2016	Monte-Carlo simulation	Ch 18 (pdf Moodle)
13	3/31/2016	Monte-Carlo simulation	See Moodle
14	4/5/2016	Quality management overview, control charts	Sec 17.1--17.12
14	4/7/2016	Nonparametric tests	Sec 16.1,16.2,16.4
15	4/12/2016	Data mining and "big data"	See Moodle
15	4/14/2016	Catch up and Review	
16	4/21/2016	Final Exam 8a-11a	

## QMM 241 Syllabus Supplement University General Education Requirement

This course is a continuation of QMM 240, covering analysis of variance, nonparametric statistics, correlation, regression, statistical process control, and time series analysis. Emphasizes business applications and computer analysis of data. Includes report writing, computer projects, and presentations. Its prerequisites are MTH 122 or 154, and QMM 240 or equivalent, with a minimum grade of 2.0 in each course. MTH 122 is a knowledge foundation area in the General Education Program. QMM 241 satisfies Oakland's General Education requirements in the *knowledge applications* area by demonstrating how knowledge in a field outside of the student's major can be evaluated and applied to solve problems across a range of applications, and knowledge of the personal, professional, ethical and societal implications of these applications. QMM 241 seeks to help the student:

- Recognize data that requires analysis of variance, use computer tools to calculate and interpret ANOVA results, and understand the assumptions underlying ANOVA.
- Recognize the purposes non-parametric tests and perform a few common tests using the computer.
- Use regression terminology correctly, analyze bivariate data (scatter plots, correlation, simple regression), and know the assumptions of least-squares regression.
- Fit trends and make forecasts from time series data using appropriate computer tools.
- Estimate a multiple regression, perform significance tests, and interpret the results. Understand the importance of data conditioning, know when a model may be over-fitted and why that can be a problem, and perform diagnostic tests for model adequacy (multicollinearity, residual tests, leverage).
- Interpret common process control charts and apply simple pattern recognition rules to detect out-of-control processes.
- Use computers confidently, write effective technical reports, and work effectively with a team

By applying methods taught in the MTH 121 prerequisite course, QMM 241 builds on concepts such as linear equations, independent and dependent variables, algebraic functions, graphs, and exponential functions and compound interest in linear trend models of time series data. Students apply MTH 122 concepts of derivatives in interpreting time series growth models, partial derivatives in interpreting regression models, and integrals as areas under curves to interpret tables of critical values and  $p$ -values in significance tests. Students apply QMM 240 concepts such as descriptive statistics, probability distributions, confidence intervals, and hypothesis tests in more complex applications (e.g., analysis of variance, nonparametric tests, and regression). QMM 241 builds upon the student's course in information technology MIS 100 (or CSE 125 or MIS 200 ) for applications of desktop software (Excel, Word, PowerPoint) to do calculations, write reports, and/or prepare class presentations. QMM 241 applies knowledge in a field outside of the student's major area of study by applying methods taught in the prerequisite courses (MTH 122 and QMM 240) and their prerequisites MTH 121 and CSE 125 (or MIS 100 or MIS 200).

The cross-cutting capacity is *critical thinking*. Students learn to find patterns and identify relationships among variables in complex data sets, estimate and apply regression models, look for anomalies in regression results (e.g., unusual residuals, high leverage, collinearity, non-normal residuals, heteroscedasticity, or autocorrelation). Students learn to apply tools such as ANOVA and regression to problems in business, economics, and not-for-profit organizations. Because this course applies knowledge from prerequisite courses along with methods taught in this course to problems of societal importance and managerial decision making, its content enhances students' critical thinking skills. Students also learn to avoid common pitfalls in reasoning from data (e.g., improper uses of regression, failed assumptions, misinterpretation of hypothesis tests or  $p$ -values, recognition of the limitations of regression). Writing is not a major component of this course, but instructors will assign written individual or team homework exercises and/or computer projects.

*Revised February 8, 2007*