1Advanced Mathematical Practicum

Instructor/Moderator: Jim Bodtke

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Classroom: Computer classroom at Pearce Community Center Second Floor

Dates: Tuesdays from 2:20 top 3:20, with deviation for field trip travel

Textbook: Howard Eves; **An Introduction to the History of Mathematics**, Saunders Publishing Co. Sixth Edition (provided)

Lab Equipment: Desktop computers with Excel and Browser (provided)

Goals:

To gain a sense of the development of mathematics throughout history and throughout the world.

To meet, test and view some basic principles of mathematics and to see how those principles are used in everyday life.

To learn the mathematics of various cultures and periods and see how blending these contributions have lead to some of the best mathematics that we have inherited.

To have fun

To visit some really cool places

Groups:

Groups of two students will work together. You are expected to meet regularly with your group partner to discuss problems and conduct Internet research on your own time using the computer labs at Saint Edward, your classroom computer, or your home computer. You are encouraged to meet outside class - by telephone if necessary, and to discuss subjects and applications with other teams. At the end of the year, each will assess the contributions of all members of the group, including her/himself. There will be no grade given in this class/practicum.

Attendance:

Class will be on Tuesday, starting Monday April 1st and continuing until school ends. Additional field trips may be scheduled on Saturdays with discussions with students and parents. Some travel may require us to be flexible.

Class Format:

Since this is the second time I have taught the class, the following descriptions are suggested and can change if we so decide. The description represents my intentions for the class as of now.

The class will be run "seminar" style in which I and others will take turns presenting material and visiting field locations. Since many students taking the class are Honors students in mathematics, I will be attempting to win your interest in continuing mathematical study in your final year(s) at Saint Edward, your high school of choice, and hopefully in your college and life pursuits.

I understand you have a choice of attending this practicum, and know that I must win your interest to be successful. I do ask that you respect my time also, as it takes time to try, fail and succeed at mathematics, life and teaching.

Here is the general outline of the course as it relates to the general areas of study such as algebra, geometry, trigonometry, statistics, calculus, engineering, accounting, economics and business finance:

The first lesson will focus on the life, times and work of several individual mathematicians as they relate to the practical side of geometric measurements. We will be starting with applications of geometry to measuring distances. Measurement concepts in astronomy and engineering will be the subject. A fundamental concept of the Pythagorean theorem will be reviewed. Other concepts such as triangulation, trigonometry, and Euclidian geometry will be introduced to you and presented. We will then go to the field and do some testing and measuring using a sextant and some rudimentary tools to measure height.

The second lesson will focus on the life, times and work of several individual mathematicians as they relate to the practical side of mathematics produced by area measurement. We will be computing volumes of circles, squares, rectangular objects, cylinders. We will also do field work in utilizing area measurement in every day applications such as construction, commerce and engineering by visiting a construction site and maybe a grain elevator.

The third lesson will take a look at the life, times and work of several individual mathematicians as they relate to the practical side of statistical mathematics and trace its origin and development to modern probability theory. We will discuss sampling, probability, game theory, standard deviation, and normal distribution curves. Our field work will revolve around predictive modeling applied to the 2007 World Series winner. You might want to check your favorite ball cap at the door, as the process can tend to get a little messy.

The fourth lesson will focus on the life, times and work of several individual mathematicians as they relate to the practical side of social science measurement. Behavior measurement and analysis will be applied to recording economic measures and predictive results in economic analysis. Some stock market simulation will occur using options and some introspective analysis will occur in accounting.

Pedagogic Steps

Each lesson will incorporate the following features:

A handout, reading assignment, or online researches to advance prepare your group. The preparation time should require less than one hour per week. Don't think of it as homework, think of it as a head-start in familiarizing yourself with the topic.

An assignment that includes mathematical problems related to the lesson plan. The assignment will be on a topic you have already covered in your math education at Saint Edward and will not be overly difficult. It will serve to refresh your memory.

A field trip to apply the measurement process included in the lesson in real life. The best part of this course (and hence the name), will be seeing the application of the lesson to real life situations and circumstances.

When preparing for your lesson, the audience you should keep in mind is your classmates and other groups

in this course. In other words, do not limit your expectations to what one might expect from seventh and eighth grade school students, but aim at an appropriate honors level (think high school or college!) As we will see, even "elementary" mathematics is often used in a sophisticated manner. You will find yourself measuring solar systems, directing a job site, running a portfolio and predicting sporting outcomes.

You are highly encouraged to use technology as part of your study. You will be instructed in computational methods using Excel or Lotus, and be expected to use your computer to research famous mathematicians and their theories. We will rely heavily on the text book and the School of Mathematics and Statistics at the University of St. Andrew Scotland http://www-history.mcs.st-andrews.ac.uk/history/index.html

Self-selected groups will work on each of the four lesson types. There will be an opportunity to regroup between the mathematician lesson field trip.

Each lesson will receive feedback from all classmates before we embark on a new topic. This will be done to insure we are having fun while we learn and assist in future course development.

I look forward to working with you this Spring, and hope we have a wonderful time exploring the wonderful world of mathematics.