MTH 101 Excel I (1)

An introductory course in Excel. Topics covered: cells and data input, formatting, Excel mathematics, functions, graphs, and filters.

Student Learning Outcomes

Students will:

1. Create, open, and view Excel workbooks
2. Enter and edit data into Excel
3. Modify a worksheet and a workbook
4. Format data and cells
5. Work with cell references
6. Learn to use functions and formulas

Course Topics

1. Understand the advantages and benefits of using Microsoft Excel
2. Create, open, and view Excel workbooks
3. Understand the fundamentals of Excel
4. Change text within a cell and add a note or comment to a cell
5. Input data
6. Apply formatting to cells
7. Understand the mathematics of Excel
8. Apply and use cell referencing
9. Use mathematical functions, counting functions, analysis functions, date and time functions, and sorting functions
10. Use charts and graphs

MTH 102 Excel II (1)

An advanced course in Excel. Topics covered: intermediate and advanced level functions, names and comments, pivot tables, advanced conditional formatting filters, and matrix functions.

Student Learning Outcomes

Students will:

1. Use intermediate level functions
2. Work with names and comments
3. Create and modify pivot tables
4. Use advanced level functions
5. Apply advanced conditional formatting filters and advanced filters
6. Apply and use matrix formulas

Course Topics

1. Use the intermediate level LOOKUP functions (VLOOKUP, HLOOKUP, XLOOKUP)
2. Create, assess, and delete named ranges
3. Transform a dataset into a table and create a pivot table
4. Format, filter, and sort data in a pivot table
5. Use the advanced level information and logical functions
6. Use the advanced level index, match, IFERROR, and offset functions
7. Apply, use, and delete conditional formatting
8. Apply, use, and delete advanced filters
9. Use matrix formulas (Index Match, IF, OFFSET, CHOOSE, XNPV, XIRR, PMT, IPMT, LEN,TRIM, CONCATENATE, CELL, MID, LEFT, RIGHT)

MTH 105 Intermediate Algebra (3)

This course is for students who have had no more than one year of high school algebra or who have not had mathematics for some time. The course consists of a review of elementary algebra and additional work in linear and quadratic equations, factoring, exponents, polynomials, graphing, and linear systems.

Student Learning Outcomes

Students will:

1. Solve linear equations/inequalities/systems of equations and graph linear equations
2. Multiply, factor, and divide polynomial expressions
3. Simplify rational expressions
4. Solve quadratic equations using a variety of methods

Course Topics

1. Algebraic Expressions and Sets of Numbers
2. Operations on Real Numbers and Order of Operations
3. Properties of Real Numbers and Algebraic Expressions
4. Linear Equations in One Variable
5. Formulas and Problem Solving
6. Linear Inequalities and Problem Solving
7. Absolute Value Equations
8. Graphing Equations
9. Introduction to Functions
10. Graphing Linear Functions
11. The Slope of a Line
12. Equations of Lines
13. Solving Systems of Linear Equations in Two Variables
14. Exponents
15. More Work with Exponents
16. Polynomials and Polynomial Functions
17. Multiplying Polynomials
18. The Greatest Common Factor and Factoring by Grouping
19. Factoring Trinomials
20. Factoring by Special Products
21. Solving Equations by Factoring and Problem Solving
22. Rational Functions and Multiplying and Dividing Rational Expressions
23. Adding and Subtracting Rational Expressions
24. Simplifying Complex Fractions
25. Dividing Polynomials: Long Division
26. Solving Equations Containing Rational Expressions
27. Radicals and Radical Functions
28. Rational Exponents

29. Simplifying Radical Expressions
30. Adding, Subtracting, and Multiplying Radical Expressions
31. Rationalizing Denominators and Numerators of Radical Expressions
32. Solving Quadratic Equations by Completing the Square
33. Solving Quadratic Equations by the Quadratic Formula
34. Solving Equations by Using Quadratic Methods
35. Quadratic Functions and Their Graphs

MTH 133 Precalculus (3)

The study of linear, quadratic, exponential, logarithmic, trigonometric, and inverse trigonometric functions and applications of such functions. These functions will be studied from a numerical, graphical, and analytical approach. A brief general study of functions will also be included.

Student Learning Outcomes

Students will:

1. Understand algebraic and graphical properties of
    a. linear and quadratic functions,
    b. exponential and logarithmic functions, and
    c. trigonometric functions

Course Topics

1. Understand interval notation
2. Understand the Cartesian Coordinate System
3. Compute the distance between two points
4. Compute the midpoint of a line segment
5. Graph linear and quadratic functions
6. Graph circles using the center and a point on the circle
7. Evaluate functions at values other than x
8. Graph piecewise defined functions
9. Determine the domain of a function
10. Determine the intervals on which a function is increasing/decreasing
11. Determine the slope and equation of a line.
12. Determine if lines are parallel, perpendicular, or neither
13. Translate, reflect, compress, and stretch graphs
14. Add, subtract, multiply, divide, and compose functions
15. Perform basic calculations with complex numbers
16. Compute the inverse of certain functions
17. Understand exponential functions
18. Understand logarithmic functions
19. Solve exponential and logarithmic equations
20. Understand trigonometric functions

MTH 150 Quantitative Literacy (3)

In this course, students are introduced to problem solving and analysis. Topics include representing and analyzing data, using logic and logical statements in arguments, estimating and approximating to judge the reasonableness of an answer, and appropriate tools and approaches to real-world problems in areas such as business and finance.

Student Learning Outcomes

Students will:

1. Demonstrate knowledge of the logic of statements and sets
2. Demonstrate basic knowledge of algebra and geometry
3. Solve problems requiring probability rules
4. Demonstrate knowledge of statistics as it applies to real-world scenarios

Course Topics

1. The Art of Problem Solving
2. The Basic Concepts of Set Theory
3. Introduction to Logic
4. Algebra
5. Geometry
6. Probability
7. Statistics

MTH 170 Statistics (3)

This is an introductory course in descriptive and inferential statistics, approached through intuition, algebra, and problem solving. Understanding of central concepts and methods is stressed. Practical applications in the fields of social and physical sciences are studied. Real-world problems are solved through use of statistical computer packages such as SPSS, SAS, or MINITAB. Prerequisites: MTH 105 and computer literacy.

Student Learning Outcomes

Students will:

1. Be able to organize and present quantitative data in numerical and visual formats. Section 1: Chapters 1-3 Organization and presentation of quantitative data.
2. Understand and apply the normal distribution. Section 2: Chapter 6
3. Sampling and statistical inference
4. Be able to compute confidence intervals using sample data
5. Be able to state appropriate hypotheses and test these hypotheses using sample data. Section 3: Chapters 7-8
6. Be able to perform the following tests: goodness of fit, regression and ANOVA. Section 4: Chapters 10-11

Course Topics

Section 1

1. Understand the difference between statistical significance and practical significance.
2. Analyze sample data relative to context, source, and sampling method.
3. Identify a voluntary response sample and know that conclusions from such a sample are not valid.
4. Distinguish between a parameter and a statistic.
5. Distinguish between quantitative data and categorical (or qualitative or attribute) data.
6. Distinguish between discrete data and continuous data.
7. Determine which level of measurement is most appropriate.
8. Determine whether basic statistical calculations are appropriate for a particular data set.
9. Understand the importance of sound sampling methods and good design of experiments.
10. Differentiate between an observational study and an experiment.
11. Understand the different types of sampling methods.
12. Determine whether an observational study used is cross-sectional, retrospective, or prospective.
13. Define and identify a simple random sample.
14. Determine whether a frequency distribution is approximately a normal distribution.
15. Summarize data in the format of a frequency distribution and a relative frequency distribution.
16. Construct a cumulative frequency distribution.
17. Identify values of class width, class midpoint, class limits, and class boundaries.
18. Understand the concepts related to distributions.
19. Picture the distribution of data in the format of a histogram and examine.
20. Develop an ability to graph data using a dotplot, stemplot, and Pareto chart.
21. Determine when a graph is deceptive.
22. Understand concepts related to scatterplots and correlation
23. Construct and analyze a scatterplot of paired data

24. Find and interpret correlation coefficients
25. Develop the ability to measure the center of data by finding the mean, median, mode, and midrange.
26. Determine whether an outlier has a substantial effect on the mean and median.
27. Interpret values of the standard deviation by applying the range rule of thumb.
28. Find values of the range, variance, and standard deviation.
29. Understand the concepts related to measures of variation.
30. Find the coefficient of variation of two samples and then compare the results.
31. Use the empirical rule or Chebyshev's theorem to estimate the variation in a sample.
32. Compute a z score and use it to determine whether a value is significant.
33. Identify percentile values and quartile values from a set of data.
34. Develop the ability to construct a boxplot from a set of data.

Section 2

1. Understand the uniform distribution
2. Understand the normal distribution and its properties
3. Know the definition of a critical value
4. Understand how to use z-scores
5. Compute probabilities from inequalities
6. Compute z-scores from probabilities
7. Understand the empirical rule
8. Understand Chebychev's Theorem
9. Understand sampling distributions
10. Know the definition of an unbiased estimator
11. Know which estimators are unbiased

Section 3

1. Be able to compute confidence intervals for proportions and means
2. Be able to compute sample sizes
3. Be able to perform hypothesis tests on proportions and means

Section 4

1. Be able to perform goodness of fit tests
2. Be able to perform ANOVA
3. Be able to perform post-hoc testing
4. Be able to perform a test of correlation
5. Be able to (and know when to) apply regression
6. Make estimates using regression

MTH 210 Calculus I (3)

The calculus of single-variable algebraic, exponential, logarithmic, and trigonometric functions culminating in the Fundamental Theorem of Calculus. Prerequisite: MTH 133, high school precalculus with a C or better, or instructor consent.

Student Learning Outcomes

Students will:

1. Understand and calculate limits
2. Understand and calculate derivatives
3. Understand and calculate basic integrals

Course Topics

1. Calculate limits using graphs and algebraic techniques
2. Understand the idea of the continuity of a function
3. Define and then calculate the slope of a tangent to a curve at a specific point on or off the curve
4. Define and then find the instantaneous velocity of an object moving along a straight line
5. Define the derivative and then calculate derivatives using the definition
6. Calculate the derivative of functions using the Power, Product, Quotient, and Chain Rules
7. Calculate the derivatives of trigonometric, exponential, and logarithmic functions
8. Differentiate functions implicitly
9. Calculate second derivatives, third derivatives, and so on
10. Understand applications of the derivative, such as related rates, how derivatives affect the shape of a graph, and L'Hospital's Rule
11. Understand the Mean Value Theorem
12. Understand antiderivatives and indefinite integrals
13. Understand the definition of the definite integral in terms of areas
14. Understand both parts of the Fundamental Theorem of Calculus

MTH 211 Calculus II (4)

Techniques of integration, applications of integration, parametric equations, polar coordinates, and infinite sequences and series. Prerequisite: MTH 210.

Student Learning Outcomes

Students will:

1. Apply Riemann integration to the concepts of volume and work.
2. Demonstrate an understanding of common techniques of integration.
3. Test convergence of infinite series using common series tests.
4. Represent, differentiate, and integrate functions as power series.
5. Represent curves both parametrically and in polar coordinates.
6. Demonstrate an understanding of the calculus of curves defined both parametrically and in polar coordinates.

Course Topics

1. *u*-substitution, integration by parts, trigonometric substitution, and partial fractions
2. Area between two curves, the volume of a solid of revolution, and the work done by a variable force
3. Infinite sequences
4. Infinite series, including telescoping and geometric
5. Integral test, limit comparison test, ratio test, alternating series test
6. Power series
7. Taylor and Maclaurin series
8. Parametric equations and the calculus thereof
9. Polar coordinates and the calculus thereof

MTH 212 Calculus III (4)

The calculus of vector functions and functions of several variables. Prerequisite: MTH 211.

Student Learning Outcomes

Students will:

1. Understand and calculate with vectors in three dimensional space
2. Understand, calculate and apply vector functions
3. Understand, calculate and apply partial derivatives
4. Understand, calculate and apply multiple integrals

Course Topics

Section 1:

1. Add and scalar multiply vectors
2. Geometric interpretation of vectors
3. Magnitude of vectors and unit vectors
4. Projection
5. Dot product and its applications
6. Cross product and its applications
7. Equations of lines and planes
8. Distance between lines, points, and planes

Section 2:

1. Parametric and vector functions
2. Derivatives of vector functions
3. Integrals of vector functions
4. Arc length
5. The tangent, normal and binormal vectors
6. Osculating planes and the TNB frame
7. Curvature
8. Projectile motion

Section 3:

1. Functions of several variables
2. Limits and continuity
3. Graphing surfaces
4. Partial derivatives
5. The chain rule
6. Directional derivatives
7. Maxima and minimums

Section 4

1. Double Integrals over Rectangles
2. Iterated Integrals
3. Double Integrals over General Regions

4. Double Integrals in Polar Coordinates
5. Applications of Double Integrals: Density, Mass and Moments of Inertia
6. Surface Area
7. Triple Integrals
8. Triple Integrals in Cylindrical and Spherical Coordinates

MTH 300 Transition to Advanced Mathematics (3)

Introduction to the methods of proof through the study of sets, logic, relations, mappings, cardinality, and elementary structures.

Student Learning Outcomes

Students will:

1. Develop skills in structured mathematical reasoning and proof
2. Develop skills in communicating mathematics with respect to the spoken and written word
3. Develop a basic understanding of sets and functions

Course Topics

1. Understand the connective words not, and, and or, along with the pair if–then as they are used in mathematics
2. Understand the quantifiers for every and there exists
3. Write the negation, converse, inverse, and contrapositive of a statement
4. Understand the notion of a counterexample and of a contradiction
5. Compute basic truth tables
6. Learn basic proof techniques and strategies for proving statements
7. Understand proof by induction
8. Understand the concept of a set, subset, and complement
9. Show two sets are equal
10. Understand the notions of union and intersection
11. Understand power sets and partitions
12. Understand Cartesian products
13. Understand the notion of a function and its domain, codomain, image, and inverse image precisely
14. Understand the notions of injectivity (one-to-one), surjectivity (onto), and bijectivity (one-to one correspondence)
15. Understand the notion of an inverse function
16. Understand the notion of the composition of functions
17. Discuss the notion of countable and uncountable sets

MTH 320 Financial Mathematics (3)

Interest rate measurement, annuities, loan repayment, bond valuation, measuring rate of return of investment, term structure of interest rates, cash flow duration and immunization, and other topics as found on Actuarial Exam FM/2. Prerequisite: MTH 211.

Student Learning Outcomes

Students will:

1. Understand interest and interest rates.
2. Understand annuities.
3. Understand debt retirement methods

Course Topics

Section 1

1. Define and recognize the definitions of the following terms: interest rate (rate of interest), simple interest, compound interest, accumulation function, future value, current value, present value, net present value, discount factor, discount rate (rate of discount), convertible m-thly, nominal rate, effective rate, inflation and real rate of interest, force of interest, equation of value.
2. Given any three of interest rate, period of time, present value, current value, and future value, calculate the remaining item using simple or compound interest. Solve time value of money equations involving variable force of interest.
3. Given any one of the effective interest rate, the nominal interest rate convertible m-thly, the effective discount rate, the nominal discount rate convertible m-thly, or the force of interest, calculate any of the other items.
4. Write the equation of value given a set of cash flows and an interest rate.

Section 2

1. Define and recognize the definitions of the following terms: annuity-immediate, annuity due, perpetuity, payable m-thly or payable continuously, level payment annuity, arithmetic increasing/decreasing annuity, geometric increasing/decreasing annuity, term of annuity.
2. For each of the following types of annuity/cash flows, given sufficient information of immediate or due, present value, future value, current value, interest rate, payment amount, and term of annuity, calculate any remaining item. Level annuity, finite term; Level perpetuity; Non-level annuities/cash flows; Arithmetic progression, finite term and perpetuity.

Section 3

1. Define and recognize the definitions of the following terms: principal, interest, term of loan, outstanding balance, final payment (drop payment, balloon payment), amortization.
2. Calculate: • The missing item, given any four of: term of loan, interest rate, payment amount, payment period, principal. • The outstanding balance at any point in time. • The amount of interest and principal repayment in a given payment. • Similar calculations to the above when refinancing is involved

3. Define and recognize the definitions of the following terms: price, book value, amortization of premium, accumulation of discount, redemption value, par value/face value, yield rate, coupon, coupon rate, term of bond, callable/non-callable.
4. Given sufficient partial information about the items listed below, calculate any of the remaining items • Price, book value, amortization of premium, accumulation of discount. (Note that valuation of bonds between coupon payment dates will not be covered). • Redemption value, face value. • Yield rate. • Coupon, coupon rate. • Term of bond, point in time that a bond has a given book value, amortization of premium, or accumulation of discount

MTH 340 Probability (3)

Probability axioms, random variables, commonly used discrete and continuous distributions, expectation, moment generating functions, transformations, and multivariate distributions. Prerequisite: MTH 211 or instructor consent.

Student Learning Outcomes

Students will:

1. Probability
2. Discrete distributions
3. Continuous distributions
4. Bivariate distributions
5. Distributions of functions of random variables

Course Topics

1. Probability
2. Multiplication rule
3. Permuations
4. Combinations
5. Sets, Venn Diagrams
6. Conditional Probability
7. Bayes theorem
8. Discrete distributions
9. Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric
10. Applications of discrete distributions
11. Expected values
12. Special expectations
13. Moment generating functions
14. Continuous distributions
15. Uniform, normal, gamma, exponential
16. Expected values
17. Special expectations
18. Moment generating functions
19. Bivariate distributions
20. Marginal distributions
21. Correlation
22. Conditional distributions
23. Expectation
24. Functions of random variables
25. Functions of random variables
26. Central limit theorem
27. Transformations

MTH 341 Applied Statistics (4)

The concepts of sampling distributions with random sampling and statistical inference. The main methods of estimation and the properties of estimators: matching moments, percentile matching, and maximum likelihood. The construction of confidence intervals for the mean, differences of two means, variances, and proportions. Hypothesis testing for the mean, variance, contingency tables, goodness of fit, and regression models. Prerequisite: MTH 211 or instructor consent.

Student Learning Outcomes

Students will:

1. Point Estimation
2. Interval Estimation
3. Hypothesis Tests
4. More Tests

Course Topics

1. Point Estimation
2. Theoretical distributions
3. Histograms and other plots
4. Order statistics and other descriptive statistics
5. Maximum likelihood estimators, method of moments
6. Unbiased estimators (sampling distributions), sufficient statistics, and the Rao-Blackwell Theorem
7. Interval estimation
8. Confidence intervals for means
9. Confidence intervals for proportions
10. Confidence intervals for paired means
11. Confidence intervals for two populations
12. Confidence intervals for regression
13. Confidence intervals for variance
14. Distribution free confidence intervals
15. Sample sizes
16. Hypothesis Tests
17. Means
18. Proportions
19. Two means
20. Two proportions
21. Power and sample size
22. Wilcoxon signed rank test
23. More tests
24. Correlation
25. Regression
26. Goodness of fit
27. Test of independence

28. 1 and 2 factor anova

MTH 344 Statistical Learning (4)

Multiple regression, classification and resampling methods. Linear model selection, tree-based methods, and unsupervised learning. Prerequisite: MTH 341 or instructor consent.

Student Learning Outcomes

Students will:

1. Linear Regression
2. Classification
3. Resampling and model selection
4. Non-linear Modeling
5. Unsupervised learning

Course Topics

1. Linear Regression
2. Simple linear regression
3. Multiple linear regression
4. Assessing model fit
5. Qualitative predictors
6. Extensions of the linear model
7. Diagnostics
8. Classification
9. Logistic regression
10. Linear discriminant analysis
11. Quadratic discriminant analysis
12. Comparison of the methods
13. K-nearest neighbors
14. Resampling and model selection
15. Subset selection
16. Shrinkage methods: the lasso and ridge regression
17. Dimension reduction: PCA
18. Considerations of high dimensional data
19. Non-linear Modeling
20. Polynomial regression
21. Step and Basis functions
22. Regression splines
23. Smoothing splines
24. Generalized additive models
25. Unsupervised learning and trees
26. Decision trees
27. Bagging, random forests, boosting
28. Support vector machines

29. PCA and clustering

MTH 360 Linear Algebra (3)

An introduction to the techniques of linear algebra. Topics include vector spaces, linear independence, basis, dimension, linear transformations, eigenvalues, and eigenvectors. Prerequisite MTH 300 or instructor consent.

STUDENT LEARNING OUTCOMES

Students will:

1. Systems of equations
2. Matrix algebra
3. Vector spaces
4. Eigensystems
5. Dot product

Course Topics

1. Systems of equations
2. Row reduction
3. Reduced row echelon form
4. Vector equations
5. Matrix equations
6. Solution sets
7. Applications
8. Linear Transformations
9. Matrix Algebra
10. Matrix Multiplication
11. Inverses
12. Invertible characterizations
13. Determinants
14. Properties of determinants
15. Applications of determinants
16. LU factorization
17. Vector spaces
18. Null and column space
19. Basis
20. Dimension and rank
21. Change of basis
22. Eigensystems
23. Eigenvectors
24. Characteristic equations
25. Diagonalization
26. Applications
27. Dot product
28. Orthogonal sets

29. Orthogonal projection
30. Gram Schmidt
31. SVD decomposition
32. Application: least squares

MTH 375 Discrete Models (3)

An introduction to the methods of discrete mathematics. Topics include linear and non-linear models. With a focus on recurrence relations, long term behavior, and the use of technology to model real-world phenomena. Prerequisite: MTH 210 or instructor consent.

Student Learning Outcomes

Students will:

1. Modeling and proportionality
2. Linear Models
3. Discrete Dynamical Systems
4. Simulations

Course Topics

1. Modeling and proportionality
2. Mathematical models (Process and definitions)
3. Proportionality
4. Fitting data to proportional models
5. Using proportionality to construct mathematical models
6. Linear Models
7. Least squares
8. Exponential models (linearizable model)
9. Logarithmic models (linearizable model)
10. Power models (linearizable model)
11. Residuals and R^2
12. Polynomial models
13. Multivariable models
14. Adjusted R^2
15. Fitting data
16. Discrete Dynamical Systems
17. Non-homogenous linear discrete dynamical systems
18. Financial models
19. Logistic Models
20. Modeling populations
21. Equilibrium values
22. Long term behavior analysis
23. Closed solutions
24. Two dimensional discrete dynamical systems
25. Predator-Prey models
26. Non-linear predator-prey models
27. SIR model
28. Simulations

29. Random number generators
30. Estimating error
31. Simulation of the birthday problem
32. Simulation of the Monty Hall problem
33. Simulation of Buffon's Needle problem
34. Poker simulation
35. Simulation of random variables
36. Queuing Model

MTH 392 Introduction to Analysis (3)

Introduction to analysis on the real line with emphasis on careful development of limits, continuity, and differentiation.

Student Learning Outcomes

Students will:

1. Know how R differs from Z and Q
2. Use the ε−N definition of a sequential limit
3. Prove results about and using the derivative
4. Use complex numbers in calculations and determine regions in the complex plane
5. Understand the complex exponential, logarithmic, and trigonometric functions
6. Use Cauchy's Integral Theorem and related results to calculate complex integrals
7. Use residues to calculate integrals

Course Topics

1. Ordered fields
2. Dedekind completeness
3. Least upper bounds and greatest lower bounds
4. Archimedean principle
5. Convergence of sequences
6. Bounded sequences
7. Monotone sequences
8. Squeeze Theorem for sequences
9. Subsequences
10. Bolzano-Weierstrass Theorem
11. Complex arithmetic and conjugates
12. Complex functions
13. Solving complex equations
14. Roots of complex numbers
15. Limits of complex functions
16. Principle branch of the complex logarithm
17. Differentiability and analyticity of complex functions
18. Complex integrals
19. Cauchy's Integral Theorem

MTH 393 Introduction to Modern Algebra (3)

An introduction to the basic notions of modern algebra. Topics covered include the integers, groups, rings, fields, homomorphisms, and related notions.

Student Learning Outcomes

Students will:

1. Define concepts related to groups
2. Prove statements related to groups
3. Understand the idea of isomorphisms of groups
4. Define concepts related to rings
5. Prove statements related to rings
6. Understand the idea of isomorphisms of rings

Course Topics

1. Decide if a given structure is a group
2. Know the "famous groups"
3. Prove properties of the identity and of inverses
4. Understand permutation groups
5. Provide examples of abelian and nonabelian groups
6. Compute subgroups of a given group and determine if the given group is cyclic
7. Determine if two groups are isomorphic
8. Prove properties of isomorphisms (including the idea of a homomorphism)
9. Prove Lagrange's Theorem
10. Apply the Theorem of Finite Abelian Groups
11. Determine if a structure is a ring and/or field
12. Determine if a structure is an integral domain
13. Prove properties of integral domains
14. Perform computations within rings of polynomials
15. Factor polynomials over a given field
16. Understand different theorems related to irreducibility of polynomials over a given field

MTH 490 Seminar in Mathematics (3)

Topics drawn from a variety of advanced topics in mathematics.

Student Learning Outcomes

Students will:

1. Show mastery of basic topics covered in Calculus I, II, and III, Transition to Advanced Mathematics, Probability, Statistics, and Linear Algebra
2. Show mastery of the proofs of the irrationality of √2 and e; the Pythagorean Theorem; the infinitude of the set of prime numbers; the Fundamental Theorem of Calculus; the sum formula for the first n positive integers; the sum formula for a geometric series; Euler's formula; Quadratic Formula; derivative of y = x^n
3. Give a presentation about a calculus topic sometimes not covered in a typical course.
4. Give a presentation about one of the following: circle, ellipse, hyberbola
5. Give a presentation on some cool topics in mathematics

Course Topics

1. Calculus presentation topics: Related rates, applied optimization, numerical integration, areas and lengths in polar coordinates
2. Cool mathematics presentation topics: Number theory, sizes of infinity, geometry, topology, decision-making, graph theory, fractals and chaos