MATHEMATICS OF PERSONAL FINANCE

Prerequisites:

Successful completion of Elementary Algebra or Applied Math I
Successful completion of Geometry or Applied Math II

Course Description

Introduction:

The Mathematics of Personal Finance Core is designed for junior and senior students and represents those standards of learning that are essential and necessary for all students. The implementation of the ideas, concepts, knowledge, and skills contained in the Mathematics of Personal Finance Core will enable students to implement the mathematical and decision-making skills they must apply and use to become wise and knowledgeable consumers, savers, investors, users of credit, money managers, citizens, and members of a global workforce and society.

The Core should be taught with respect for differences in learning styles, learning rates, and individual capabilities without losing sight of the common goals. Instruction will incorporate a "hands-on" approach involving techniques such as problem solving, reasoning, simulation, representing and interpreting data, and application of related mathematical topics. Direct application of the concepts of this Core to the world in which students live will empower them to incorporate the concepts of the Mathematics of Personal Finance Core into their lives. The Mathematics of Personal Finance Core will also incorporate skills from language arts, social studies, applied technology, character education, and applied service learning.

Successful completion of this course will fulfill 1credit toward the supplemental or applied mathematics requirements and complete the General Financial Literacy requirement by demonstrated competency. Beginning with the class of 2008, all students will be required to successfully complete the General Financial Literacy requirement to graduate.

Intended Learning Outcomes:

The Intended Learning Outcomes (ILOs) describe the skills and attitudes students should learn as a result of successful participation in the Mathematics of Personal Finance (MPF) course. Intended Learning Outcomes are an essential part of the MPF Core and provide teachers with a standard for evaluation of student learning. Significant understanding occurs when teachers incorporate ILOs in planning instruction for the MPF course.

By the end of the MPF course students will:

1. Apply sound mathematical principles in their financial decisions.
2. Interpret and analyze graphical representations of real-world data.
3. Be informed and prepared to be prudent managers of financial resources, enabling them to achieve long- and short-term financial goals and security.
4. Be engaged in establishing career goals that will provide adequate income and personal fulfillment.
5. Demonstrate an understanding of personal financial planning and sound money management skills.
6. Actively participate in and understand management of personal savings and investments.
7. Accept responsibility for and understand personal and societal consequences of financial decisions.

Core Standards of the Course

It is intended that students will incorporate the following mathematical skills to be successful in the Mathematics of Personal Finance.

Compute fluently and make reasonable estimates.

- Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*).
- Interpret the meaning of integers in real-life situations and identify the need to use integer representation.
- Perform simple probability experiments and calculations.

Evaluate, solve, and analyze mathematical situations using algebraic properties and symbols.

- Identify meanings of variables in formulas such as $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$.
- Identify the effects of changing the variables within equations and how the graph of the equation is affected.
- Solve equations for a specified variable.
- Interpret the rate of growth of functions.
- Graph functions (e.g., linear, quadratic, exponential).

Formulate and answer questions by collecting, organizing, and analyzing data.

- Collect, organize and display data using graphical representations including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs.
- Interpret and analyze data to make predictions.
- Calculate mean, median, mode, and range.
- Identify the line of best fit for the relationship of two variables and interpret the correlation as being positive, negative, or no correlation.
- Use spreadsheets to evaluate data.
- Use a chart, table, or graph to find information (e.g., tax tables or amortization charts).

Standard 1: Students will use a rational decision-making process to set and implement financial goals.		
Objective **1** Explain how goals, decision making, and planning affect personal financial choices and behaviors. • Discuss personal values that affect financial choices (e.g., home ownership, work ethic, charity, civic virtue). • Explain the components of a financial plan (e.g., goals, net worth statement, budget, income and expense records, an insurance plan, a saving and investing plan). • Compare short-term and long-term financial goals. • Design a plan to reach a specific financial goal. • List advantages of designing and following a personal financial plan. Math Concepts: • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Calculate mean, median, mode, and range. Suggested Processes, Strategies, and Materials: • Graphing different long-term incomes considering minimum wage, education, vocation, demand, living location • Graphing renting vs. home ownership • Students collecting data about long-term and short-term finances, graphing them, and making predictions from the graphs	Objective 2 Analyze the role of cultural, social, and emotional influences on financial behavior. • Explain how limited financial resources affect the choices people make. • Describe the influence of peer pressure as it relates to purchasing decisions (e.g., fashion, acceptance from others, need for latest gadget). • Explain how scarcity relates to needs and wants. Analyze the impact of marketing, advertising, and sales strategies/techniques on purchasing decisions (e.g., impulse buying, delayed payment). • Evaluate the role of emotions when making financial decisions. Math Concepts: • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Students will collect and graph information about costs related to personal needs vs. wants. • Write about the similarities and differences in graphs of supply and demand.	Objective 3 Relate financial decisions to personal and societal consequences. • Recognize that individuals are responsible for their finances. • Describe consequences of excessive debt (e.g., increased consumer costs, inflation, family instability). • Describe the social and economic consequences of bankruptcy. Math Concepts: • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret the rate of growth of functions. Suggested Processes, Strategies, and Materials: • Graph and analyze data on reasons for divorce and bankruptcy. • Compare rates of divorce over time. Compare rates of bankruptcy over time.

Standard 2: Students will understand sources of income and the relationship between income and career preparation.		
Objective 1 Identify various forms of income and analyze factors that affect income. • Identify sources of income (e.g., wages, investments, self-employment). • Compare common employee benefits (e.g., insurance, leave, retirement). • Compare income to the cost-of-living in various geographical areas. Analyze how economic conditions affect income. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, irrational numbers such as *e*). • Identify meanings of variables in formulas such as $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$. • Identify the effects of changing the variables within equations and how the graph of the equation is affected. • Solve equations for a specified variable. • Interpret the rate of growth of functions. • Graph functions (e.g., linear, quadratic, exponential). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Calculate mean, median, mode, and range. • Identify the line of best fit for the relationship of two variables and interpret the correlation as being positive, negative, or no correlation. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Graph and analyze poverty level vs. minimum wage.	Objective 2 Identify and understand required income withholdings. • List the reasons for taxation and uses of tax revenues. • Describe the purposes of Social Security and Medicare. • Calculate net income from an employee payroll record. • Demonstrate how to complete personal state and federal income tax forms. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, irrational numbers such as *e*). • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Compare early retirement benefits of Social Security to full retirement benefits of Social Security. • Calculate the net income and calculate the percentages of gross that go for state tax, federal tax, Medicare, and Social Security. • Have students calculate income and taxes for a vocation in which they have an interest.	Objective 3 Analyze criteria for selecting a career and the impact of career choices on income and financial stability. • Describe the correlation between income and a worker's skills, education, the value of the work to society, condition of the economy, and the supply and demand for workers. • Develop career plan(s) that include educational requirements, skill development, and income potential. • Analyze the costs and benefits of developing new skills for the workplace. • Identify the risks and rewards of entrepreneurship/self-employment. Math Concepts: • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Calculate mean, median, mode, and range. • Identify the line of best fit for the relationship of two variables and interpret the correlation as being positive, negative, or no correlation. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Investigate and describe the costs associated with obtaining a chosen vocation (e.g., training, equipment, education, apprenticeship). • Graph and chart the cost of schooling with your income potential.

• Gather, review, and analyze the data for the income opportunities of education vs. non-education, and investing at a young age. • Analyze the effect of interest rate on return of investment. • Graph and analyze the total employee benefit package. Compare different packages in same job and different jobs. Calculate the costs of different insurance packages, taxable vs. non-taxable compensation. • Calculate and compare income pre-tax withholdings vs. post-tax withholdings (e.g., flex spending, 401Ks, Roth IRAs, and other investments). • Compare and contrast the cost-of-living in various geographical areas and other factors which affect it (e.g., calculate the percent difference in living in different areas). • Use spreadsheets throughout the objective.		

Standard 3: Students will understand principles of money management.		
Objective 1 Describe the role of planning and maintaining a balanced budget. • Develop, monitor and evaluate a personal budget. • Discuss opportunity costs and trade-offs on budget implementation. • Identify and discuss the social and personal consequences of not following a budget. • Compare and evaluate various tools available for keeping track of budgets (e.g. envelope systems, computer programs, and paper tracking). • Demonstrate knowledge of financial transactions, checking and savings accounts and associated financial services. Demonstrate how to manage a checking account. • Evaluate the impact of major purchases on budgeting (e.g. automobile, housing). Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Interpret the meaning of integers in real-life situations and identify the need to use integer representation. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Have students investigate purchasing a car (insurance, service, gas, used or new car, types of loans, leasing and buying a hybrid car vs. a gasoline-efficient car); a cell phone plan; living costs of going to college; student loans. • In times of inflation, what type of a savings plan would be beneficial? • Have students participate in a long-term scenario where they actually experience making banking transactions.	Objective 2 Understand credit uses and costs. • Discuss the history and role of credit. • List basic types of credit (e.g., credit cards, installment loans, service credit, revolving credit, student loans). • Describe the risks and responsibilities associated with using credit. • Identify methods of establishing and maintaining a good credit rating. • Explain the purpose of co-signers and collateral when applying for a loan. • Identify warning signs of credit abuse (e.g., late fees, missed payments, collection notices, and bounced checks) and ways to correct credit problems. • Calculate and compare costs associated with the use of credit (e.g., finance charges, interest, late fees, default rates, and closing costs). • Calculate how long it takes to repay debt and the total costs when a borrower makes minimum payments. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Identify meanings of variables in formulas such as $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$. • Identify the effects of changing the variables within equations and how the graph of the equation is affected. • Solve equations for a specified variable. Suggested Processes, Strategies, and Materials: • Look at different scenarios of paying off a credit card (paying minimum, 3 months, 6 months, etc.). • Analyze an amortization chart and look at how	Objective 3 Describe the impact of credit on money management. • Compare the advantages and disadvantages of different payment methods. • Compare the services of various types of financial institution (e.g., banks, credit unions, investment brokers, loan agencies) and identify advantages of comparison shopping before selecting financial services. • Describe the relationship between a credit rating and the cost of credit and factors that affect credit worthiness. • Explain the value of credit reports and scores to borrowers and lenders. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. Suggested Processes, Strategies, and Materials: • Investigate why one bank or credit union gives you 10% interest while another will give you only 5% interest. • Look at credit ratings and how they are calculated. How do different credit ratings affect your rate of interest when you are borrowing?

• Practice balance and reconciliation of bank statement. • Use a spreadsheet and formulas to evaluate major purchases.	paying extra payments affects the mortgage. Graph different scenarios on the same plot. • Look at amortization formulas (change different variables in the formula). When is refinancing valuable or cost effective? How does a down payment change how much you will pay over time? • Investigate home equity loans.	

Standard 3 Continued:		
Objective 4 Describe the rights and responsibilities of buyers and sellers under consumer protection laws. • Explain the purposes and features of consumer protection laws, agencies and sources for assistance. • Describe ways to avoid "identity theft" and fraud (e.g., keeping Social Security numbers secure, properly dispose of outdated documents). • Explain the importance of understanding financial contracts (e.g., disclosure information, grace period, payment penalties, and method of interest calculation). • List possible actions a consumer can take in response to excessive debt and collection practices (e.g., sell assets, negotiate a repayment schedule). • Describe ways to avoid financial scams and schemes designed to defraud consumers (e.g., Ponzi and pyramid schemes, affinity fraud). Math Concepts: • Identify meanings of variables in formulas such as $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$. • Identify the effects of changing the variables within equations and how the graph of the equation is affected. • Solve equations for a specified variable. • Interpret the rate of growth of functions. • Graph functions (e.g., linear, quadratic,	Objective 5 Discuss the purposes for insurance and risk management. • Identify common types of insurance (e.g., automobile, health, homeowners, renter's, life, long-term disability) and their terminology (e.g., term, whole life, deductible, premium, grace period). • Describe how insurance and other risk-management strategies protect against financial loss. • Discuss insurance needs at various life stages. • Identify the importance of estate planning (wills, trusts). • Discuss the consequences of being under-insured. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Perform simple probability experiments and calculations. Suggested Processes, Strategies, and Materials: • Compare and contrast term and whole life (adding up costs of funerals; costs after death for those still living [having an education] getting insurance when you're young; group plans vs. individual). • Have an actuary come and speak to the students.	

exponential). Suggested Processes, Strategies, and Materials: • Buying points on mortgage. • Study exponential functions, tree diagrams, and scatter-plots to look at schemes such as: Send me $1.00, put your name at the bottom of the list and send this letter to 5 friends. • Graph exponential functions when you sell to 5 friends and then they sell to 5 friends. How long can you actually do that?	• Investigate the advantages of a will or a trust and costs involved. (Have a lawyer come as a possible speaker to discuss this.) • Why do we buy insurance? Investigate the cost of fixing the problem vs. the cost of paying insurance premiums (properties of risk management). • Compare liability vs. full coverage; health savings plan vs. health insurance. • Investigate extended warranties—when is it worth it?	

Standard 4: Students will understand savings, investing, and retirement planning.		
Objective 1 Describe the value and use of savings in financial planning. • Identify ways to save (e.g., payroll deduction). • Analyze reasons to save. • Explain how government regulations protect savers. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Analyze when flex spending is beneficial and when it isn't. • Analyze different savings plans (e.g., CDs, savings accounts, money markets, IRAs, Roth IRAs, 401Ks).	Objective 2 Describe the value of investing and types of investments in the financial planning process. • Identify and explain types of investment vehicles (e.g., stocks, bonds, real estate, hard assets). • Identify strategies for investing (e.g., diversification, dollar cost averaging.) • Compare long-term and short-term investments. • Explain how government regulations can protect investors. • Compare various sources of investment information (e.g., prospectus, annual reports, financial publications, online information) and ways to buy/sell investments (e.g., full service and discount brokers, investment advisors, online brokers). Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Simulate investing in different types of investments, and buying and selling investments (Stock Market game). • Analyze bonds, company stock, profit sharing, etc. • Read and analyze annual reports, % of cash,% invested, manipulation of graphs.	Objective 3 Compare savings and investments. • Compare the risk, return, liquidity, and costs for savings and investments. • Explain the effects of inflation on savings and investments. • Describe the concept of the time value of money. • Analyze the relationship between risk and return. • Describe appropriate financial products for different financial goals (e.g., savings accounts, stocks, property). Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Calculate present value of future sums. • Based on your financial goals, create an appropriate financial plan that includes things such as savings, investments, pay off strategies, etc. • Use your financial plan to create a timeline for your plan.

Standard 4 Continued:		
Objective 4 Analyze the financial preparation for retirement. • Relate financial resources needed for specific retirement activities and lifestyles. • Compare the characteristics of retirement plans (e.g., individual, employer-sponsored, Social Security). • Evaluate the role of individual responsibility in planning for retirement. • Analyze the power of compound interest and the importance of starting early in implementing a financial plan for retirement. Math Concepts: • Perform operations with real numbers (e.g., fractions, decimals, percents, integers, and irrational numbers such as *e*). • Identify meanings of variables in formulas such as $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$. • Identify the effects of changing the variables within equations and how the graph of the equation is affected. • Solve equations for a specified variable. • Interpret the rate of growth of functions. • Graph functions (e.g., linear, quadratic, exponential). • Collect, organize and display data using graphical representations, including scatter plots, line graphs, bar graphs, circle graphs, histograms and pictographs. • Interpret and analyze data to make predictions. • Use spreadsheets to evaluate data. • Use a chart, table, or graph to find information (e.g., tax tables or amortization charts). Suggested Processes, Strategies, and Materials: • Determine the amount of money you need to save in order to maintain your present lifestyle after retirement. (Look at inflation, secondary insurance, etc.)		

• Graph and analyze the differences between annually, monthly, weekly, daily, and continuously compounding interest.		