Math 1015: Mathematics of Finance

Credit hours: **3 credit hours**
Prerequisites: **Placement in ACCUPLACER Grid 3 or MATH 0100 with a grade of C or better or MATH 1005 with a grade of C or better**

Course Description

This course studies in depth the topics of simple interest, bank discount, compound interest and annuities, including amortization and sinking funds.

Course Objectives

1. Develop the understanding of concepts and terms associated with finance
2. Utilize the mathematical formulas necessary for financial computations
3. Solve applied problems of simple interest, bank discount, compound interest, and annuities certain

Learning Outcomes

1. Investigate simple and compound interest problems for present and future value using ordinary and exact time
2. Calculate bank discount loans
3. Solve business and consumer loan problems dealing with open-ended credit, installment loans, early payoff of loans, personal property loans, and real estate loans
4. Apply the straight-line method and double-declining method to depreciation problems
5. Find the effective interest rate of simple interest and compound interest problems
6. Compute ordinary annuities and annuities due
7. Perform calculations involving sinking funds and the amortization of loans

Course Topics

I. SIMPLE INTEREST

- A. Formula for simple interest: $I = Prt$
  1. Solve for I
  2. Solve for P, r, or t
- B. Formula for maturity value: $S = P + I$
- C. Types of interest
  1. Ordinary interest
  2. Exact interest
- D. Types of time
  1. Ordinary
  2. Exact
- E. Formula for present value: $P = \frac{S}{1+rt}$
- F. Equations of value
- G. Investment analysis*
  1. Discount all cash flows at a given rate
  2. Find internal rate of return
- H. Partial payments
  1. Merchants' Rule
  2. U.S. rule

II. BANK DISCOUNT

A. Formula for bank discount: $D = Sdt$
   1. Solve for D
   2. Solve for S, d or t
B. Formula for proceeds: $P = S - D$
C. Formula for maturity value: $S = \frac{P}{1-dt}$
D. Conversion of discount rate to interest rate and vice versa: $r = \frac{d}{1-dt}$, $d = \frac{r}{1+rt}$
E. Value of a promissory note at any point in time

III. COMPOUND INTEREST

A. Formula for compound interest: $S = P(1+i)^n$
   1. Solve for S
   2. Solve for i or n (linear interpolation)
B. Effective interest rate
C. Interest for part of a period
D. Present value at compound interest: $P = S(1+i)^{-n}$
E. Extension of tables
F. Equations of value

IV. ANNUITIES

A. Ordinary
   1. Amount of ordinary annuity: $S_n = Rs_{n/i}$
      a. Solve for S_n
      b. Solve for R, n, or i
   2. Present value: $A_n = Ra_{n/i}$
      a. Solve for A_n
      b. Solve for R, n, or i
   3. Extension of tables
   4. Amortization and sinking funds
B. Annuity due: $S_n = R\left(s_{n+1/i} - 1\right)$, $A_n = R\left(a_{n-1/i} + 1\right)$ *
C. Deferred annuity: $A_n = Ra_{n/i}(1+i)^{-m}$ *

V. PERPETUITIES*

*Optional