

# MATH 3400

## THEORY OF INTEREST

### **Course Description:**

A study of the measurement of interest, annuities, amortization schedules and other miscellaneous topics. **3 credits**

### **Prerequisites:**

MATH 1970

### **Overview of Content and Purpose of the Course:**

To introduce students to the theory of interest which plays a large role in the insurance and banking world.

### **Anticipated Audience/Demand:**

For students who may have an interest in an actuarial career or persons presently employed by the insurance community who may be interested in taking the third actuary examination.

### **Major Topics:**

#### **1. The measurement of interest**

- a. Introduction
- b. The accumulation and amount functions
- c. The effective rate of interest
- d. Simple interest
- e. Compound Interest
- f. Present value
- g. The effective rate of discount
- h. Nominal rates of interest and discount
- i. Varying interest
- j. Summary of results

#### **2. Solution of problems in interest**

- a. Introduction
- b. Obtaining numerical results
- c. The basic problem
- d. Equations of value
- e. Unknown time
- f. Unknown rate of interest

### **3. Elementary annuities**

- a. Introduction
- b. Annuity-immediate
- c. Annuity-due
- d. Annuity values on any date
- e. Perpetuities
- f. Fractional terms
- g. Unknown time
- h. Unknown rate of interest
- i. Varying interest

### **4. More general annuities**

- a. Introduction
- b. Annuities payable less frequently than interest is convertible
- c. Annuities payable more frequently than interest is convertible
- d. Continuous annuities
- e. Unknown time and unknown rate of interest
- f. Elementary varying annuities
- g. More general varying annuities
- h. Continuous varying annuities

### **5. Amortization schedules and sinking funds**

- a. Introduction
- b. Finding the outstanding principal
- c. Amortization schedules
- d. Sinking funds
- e. Differing payment periods and interest conversion periods.
- f. Yield rates
- g. Reinvestment rates

### **6. Bonds and other securities**

- a. Introduction
- b. Types of securities
- c. Price of a bond
- d. Premium and discount
- e. Valuation between interest payment dates
- f. Determination of yield rates
- g. Callable bonds
- h. Serial bonds
- i. Some generalizations
- j. Other securities

**Methods:**

The class will be presented primarily in lecture form.

**Textbook:**

Guthrie, Gary C., and Larry D. Lemon. *Mathematics of Interest Rates and Finance*. London: Pearson, 2003.

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