



Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: Kyle Wu

**Prerequisite:**

ACMA 320. Cannot repeat for credit if taken as STAT 490 or ACMA 490 previously.

**Textbook:**

*Introduction to the Mathematics of Demography*, 3<sup>rd</sup> ed. By R. Brown, pub: ACTEX

**Calendar Description:**

Data: Sources and Errors. Measures of mortality and fertility: Crude rates, Age-specific mortality rates, Adjusted measures of mortality. Construction of Life Tables from census data: 1989-91 U.S. Life Table, 1990-92 Canadian Life Table. Stationary Population Theory: survivorship group, Lexis diagram. Stable Population Theory: Sharpe-Lotka theorem, growth rate, quasi-stable populations. Population Projections: logistic curve, component method. Uses of Census Data: Funding Social Security.

**Quantitative**

**Outline:**

**1. DATA: SOURCES AND ERRORS.**

- Definition of demography.
- Collection of demographic statistics.
- Censuses.
- Sources of errors and their corrections.
  - o Coverage errors; Response errors; Misstatement of age; Processing errors; Sampling errors; Gross/net error ratio.

**2. MEASURES OF MORTALITY AND FERTILITY.**

- Terminology.
- Crude rates.
- Age-specific mortality rates.
- Adjusted measures of mortality.
- Measures of infant mortality.
- Age-specific fertility rates.

**3. CONSTRUCTION OF LIFE TABLES FROM CENSUS DATA.**

- A generic method for constructing the survival curve of a hypothetical birth cohort.
- The 1989-91 U.S. Life Table.
  - o Under 2 years; Ages 2 to 94 years; Ages over 94 years; Other Life Table values.
- The 1990-92 Canadian Life Table.
  - o Infant Tables ; Adults Tables.
- Abridged Life Tables.
- Analysis of the Life Table by cause of death.

**4. STATIONARY POPULATION THEORY.**

- Definitions: stationary population,  $L_x$ ,  $T_x$ ,  $Y_x$ .
- Analysis of the survivorship group.
- Characteristics of stationary populations.
- The Lexis diagram.
- Applications.

## 5. STABLE POPULATION THEORY.

- Definitions.
- The Sharpe-Lotka theorem.
- The characteristic equation (or renewal equation).
- The growth rate.
- Applications.
- Quasi-stable populations.

## 6. POPULATION PROJECTIONS.

- Inter-censal and immediate post-censal estimates.
  - o Linear interpolation; Polynomial interpolation; Geometric modeling.
- The logistic curve.
- The component method.

## 7. USES OF CENSUS DATA.

- Examples.
- Funding Social Security.

### **Grading Scheme:**

Assignments & Term Project: 30%

2 Midterms: 35% each

*The grading is subject to change*

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*Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.*

Revised July 28, 2011