Actsc 611 Financial Mathematics I

Syllabus

- Accumulation and discount under deterministic models of interest, including simple and compound interest
- Expression of interest over different conversion periods
- Real and money rates of interest
- Valuation of deterministic cash flow series, including annuities.
- Interest rate and annuity functions for the constant compound interest model, including \( i, v, \delta, \overset{(p)}{i}, d^{(p)}, a_{\overset{(m)}{}} \), \( s_{\overset{(m)}{}} \), \( \overset{(m)}{a} \), \( \overset{(m)}{\bar{a}} \), \( \overset{(m)}{s} \). 
- Equations of Value, including solving for payment amount, payment timing or interest rate.
- Loan schedules.
- Fixed coupon bonds, including notation, conventions and valuation. Examples from government, municipal and private sector issues. Valuation including allowance for taxation.
- Real return bonds, including notation, conventions and valuation.
- Term structure of interest rates. Cashflow valuation under term structure. Duration and convexity. Redington’s immunization.
- The no arbitrage pricing principle.
- Forward contracts; pricing by replication.

Notes: This course almost fully covers the syllabus of CT1, with the exception of (i) Discounted Cash Flow, which is covered in Actsc 614, and (ii) Stochastic models for interest rates, which is covered, in depth, in Actsc 631. This course covers around 65% of the material for the SOA course FM.
**Textbook:** Many books cover this material. We currently use *Mathematical Interest Theory*, by Daniel & Vaaler for our undergraduate version of this course. However, this course includes significantly more material, and more advanced material than the undergraduate course.

**Contact Hours:** 36 lectures, 10 tutorials.

**Assessment:** 65% final exam (unseen); 15% midterm exam (unseen); 20% assignments.