

# Actuarial Mathematics I

The prerequisites for these lectures is a course in basic probability theory and a basic knowledge in measure theory.

The lectures offer an introduction to actuarial mathematics of life insurances.

## Contents

- Elementary financial mathematics.  
Discussion of different ways to describe interest payments, the valuation of payment flows and the concept of the present value.
- Stochastic models of the risk insured and the insurance contract in the settings “one person under single risk”, “several persons under single risk” and “one person under competing risks”.
- Basic principles of premium calculation.  
The principle of equivalence for stochastic payment flows and the equivalence premium.
- The dynamics of the reserve process.  
Recursions for the reserve process in discrete time and Thiele’s integral equations in continuous time.
- Analysis of the loss process.  
Hattendorff’s theorem on the decomposition of the loss process into losses in different years and states of the policy.

## References

- H. MILBRODT AND M. HELBIG (1999). *Mathematische Methoden der Personenversicherung*. de Gruyter, Berlin.
- M. KOLLER (2000). *Stochastische Methoden in der Lebensversicherung*. Springer, Berlin.
- H.U. GERBER (1995). *Life Insurance Mathematics* (2nd. ed.). Springer, Berlin.