

Macedonian actuarial association „Actuary”

EDUCATIONAL PROGRAM FOR ACTUARIES



Skopje, December 2015

Based on Article 9 Paragraph (2) of the Statute of MAA "Actuary", the Assembly of MAA "Actuary" on its additional regular meeting held on 23.12.2015, adopted the following:

EDUCATIONAL PROGRAM FOR ACTUARIES

I. GENERAL PROVISIONS

Article 1

(1) This Educational program for actuaries (hereinafter referred to as: Program), prescribes closely „the actuarial education“ that should be completed by a regular member of MAA "Actuary", according to Article 9 of the Statute of MAA "Actuary".

II. CHARACTERISTICS OF THE EDUCATIONAL PROGRAM FOR ACTUARIES

Article 2

(1) The Program corresponds to the educational program completed by the actuaries in Macedonia up to the preparation of this Program. Consequently, the existing regular members of MAA "Actuary" have completed their actuarial education in accordance to this program..

(2) The Program is prepared according to the guidelines issued by the International actuarial association.

(3) Integral part of the Program is a Comparative table between the guidelines issued by the International actuarial association and the Program.

(4) Integral part of the Program is a List of subjects and its detailed contents that should be covered with the actuarial education of the new members of MAA "Actuary".

III. FINAL PROVISIONS

Article 3

(1) This Program will enter into force 8 days after the date of its adoption on the Association's Assembly.

Skopje, 23.12.2015

President of the Assembly of MAA "Actuary"

Biljana Petroska

Comparative table

GCEA		IAA	Actuarial education required for a full membership in MAZ
GENERIC TECHNICAL SUBJECTS			
1	Computing		Acquired during the university education
2	Regulation and Legislation and Taxation		Law, legislation and regulation
3	Communication Skills		Acquired during the university education
4	Language skills		Acquired during the university education
GENERIC TECHNICAL SUBJECTS			
1	Mathematics		Acquired during the university education
2	Probability and Statistics	Probability and Mathematical Statistics	Probability and Statistics
3	Stochastic Processes and Modelling	Modelling	Stochastic Modelling
5	Economics	Economics	Economics
6	Accounting and Financial Reports	Accounting	Accounting and Financial statements
7	Legislation		Law, legislation and regulation
ACTUARIAL TECHNICAL SUBJECTS			
1	Financial Mathematics	Financial Mathematics	Financial Mathematics
2	Multiple state modelling	Modelling, Actuarial Mathematics, Statistical Methods	Survival Models
3	Contingencies		Actuarial Mathematics 1 Actuarial Mathematics 2
4	Risk Mathematics		Actuarial Mathematics 2
4	Finance and financial markets	Investment and Asset Analysis	Investment and Asset Management
5	Quantitative Risk Management and Solvency	Actuarial risk management	Life insurance Nonlife insurance Pension Insurance Health insurance
ACTUARIAL APPLICATIONS			
1	Actuarial enterprise risk management	Actuarial risk management	Life insurance Nonlife insurance Pension Insurance Health insurance
2	Professionalism	Professionalism	Professionalism and ethics
SPECIALISATION			
1	Specific application area		Acquired during the practical experience of at least 1 years
2	Country specific legislation		Country specific legislation is included in subjects where relevant

List of subjects and its detailed contents that should be covered with the actuarial education

Contents

1.	PROBABILITY AND STATISTICS (25 hours)	5
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9.	LIFE INSURANCE (30 hours)	23
10.	NONLIFE INSURANCE (30 hours)	26
11.	PENSION INSURANCE (25 hours)	30
12.	HEALTH INSURANCE (25 hours)	32
13.	ACCOUNTING AND FINANCIAL STATEMENTS (20 hours)	35
14.	LAW, LEGISLATION AND REGULATION (20 hours)	38
15.	PROFESSIONALISM AND ETHICS (10 hours)	41

1. PROBABILITY AND STATISTICS (25 hours)

Subject structure

1. Summarizing data
 - 1.1. Tabular and graphical methods
 - 1.2. Mean, median and mode
 - 1.3. Standard deviation and range of data
 - 1.4. Symmetry and skewness
2. Introduction to probability
 - 2.1. Sample space, experiment and random events
 - 2.2. Probability axioms and the addition rule
 - 2.3. Conditional probability and independence
 - 2.4. Bayes' theorem and theorem of total probability
3. Random variables
 - 3.1. Discrete random variables
 - 3.2. Continuous random variables
 - 3.3. Mathematical expectation
 - 3.4. Important discrete distributions
 - 3.5. Important continuous distributions
 - 3.6. Functions of random variables
4. Generating functions
 - 4.1. Probability generating functions
 - 4.2. Moment generating functions
 - 4.3. Cumulant generating functions
5. Joint distributions
 - 5.1. Joint distribution
 - 5.2. Expectations of functions of two variables
 - 5.3. Convolutions
 - 5.4. Using generating functions to derive distributions of linear combinations of independent random variables
6. The Central limit theorem
 - 6.1. The Central Limit Theorem
 - 6.2. Normal approximations
 - 6.3. The continuity correction
7. Sampling and statistical inference
 - 7.1. Basic definitions
 - 7.2. Moments of the sample mean and variance
 - 7.3. Sampling distributions of the normal population
 - 7.4. Sampling t – distribution
 - 7.5. Sampling F – distribution
8. Point estimation
 - 8.1. The method of moments
 - 8.2. The method of maximum likelihood

- 8.3. Unbiased estimators
- 8.4. The mean square error and efficiency of estimators
- 8.5. Asymptotic distribution of MLE
- 9. Confidence intervals
 - 9.1. Definition and derivation of confidence intervals
 - 9.2. Confidence intervals for the parameters of the normal distribution
 - 9.3. Confidence intervals for the parameters of binomial and Poisson distribution
 - 9.4. Confidence intervals for two-sample problems
 - 9.5. Paired data
- 10. Hypothesis testing
 - 10.1. Statistical hypotheses, test statistics, decisions and errors
 - 10.2. Classical testing, significance and P -values
 - 10.3. Basic tests – sample from a single population
 - 10.4. Basic tests – samples from two independent populations
 - 10.5. Basic test paired data
 - 10.6. Tests and confidence intervals
 - 10.7. Chi square tests for independence of categorical variables and goodness of fit
- 11. Correlation and regression
 - 11.1. Bivariate data
 - 11.2. Correlation analysis
 - 11.3. Regression analysis the simple linear model
 - 11.4. The multiple linear regression model
- 12. Analysis of variance
 - 12.1. One-way analysis of variances
 - 12.2. Examining the treatment means
- 13. Conditional expectations
 - 13.1. The conditional expectation $E(Y|X = x)$
 - 13.2. The random variable $E(Y|X)$
 - 13.3. The random variable $V(Y|X)$ and the " $E(V) + V(E)$ " result

Literature:

1. H.P. Hsu, *Theory and Problems of Probability, Random Variables and Random Processes*, The McGraw-Hill Companies, Inc, USA, 1997.
2. D.D.Wackerly, W. Mendenhall III, R.L. Scheaffer, *Mathematical Statistics with Applications*, 7th Edition, Brooks/Cole, Cengage Learning, USA, 2008
3. Faculty and Institute of Actuaries, *Subject 101*

2. FINANCIAL MATHEMATICS (25 hours)

Subject structure

1. Cash-flow models
 - 1.1. Cash-flow process
 - 1.2. Examples of cash-flow scenarios
2. The time value of money
 - 2.1. Simple interest
 - 2.2. Compound interest
 - 2.3. Present values
 - 2.4. Simple discount
 - 2.5. Investing over a period
3. Interest rates
 - 3.1. Nominal rates of interest
 - 3.2. Accumulation factors
 - 3.3. The force of interest
 - 3.4. Present values
 - 3.5. The basic compound interest functions
 - 3.6. Interest payable p-thly
4. Discounting and accumulating
 - 4.1. Present values of cash-flows
 - 4.2. Valuing cash-flows
 - 4.3. Interest income
5. Level annuities
 - 5.1. Present values
 - 5.2. Accumulations
 - 5.3. Perpetuities
 - 5.4. Continuously payable annuities
 - 5.5. Annuities payable p-thly
 - 5.6. Non- integer values of n
6. Deferred and increasing annuities
 - 6.1. Deferred annuities
 - 6.2. Varying annuities
 - 6.3. Special cases
7. Equations of value
 - 7.1. The expectation of value and the yield on a transaction
 - 7.2. Uncertain payment or receipt
8. Loan schedules
 - 8.1. Calculating the capital outstanding
 - 8.2. Calculating the interest and capital elements
 - 8.3. The loan schedule
 - 8.4. Instalments payable more frequently than annually
 - 8.5. Consumer credit

9. Project appraisal
 - 9.1. Fixed interest rates
 - 9.2. Different interest rates for lending and borrowing
 - 9.3. Measurement of investment performance
10. Investments
 - 10.1. Fixed interest Government borrowings
 - 10.2. Fixed interest borrowings by other bodies
 - 10.3. Share and other equity type borrowing
 - 10.4. Property
 - 10.5. Derivatives
11. Simple compound interest problems
 - 11.1. Fixed interest securities
 - 11.2. Uncertain income securities
 - 11.3. Real rates of interests
 - 11.4. Indexed linked bonds
 - 11.5. Capital gains tax
12. Arbitrage and forward contracts
 - 12.1. The “No Arbitrage” assumption
 - 12.2. Forward contracts
13. Term structure of interest rates
 - 13.1. Discrete time
 - 13.2. Continuous time rates
 - 13.3. Theories of the term structure of interest rates
 - 13.4. Duration, convexity and immunization
14. Stochastic interest rate models
 - 14.1. Simple models
 - 14.2. The log-normal distribution

Literature:

4. J. J. McCutcheon, W. F. Scott, *An Introduction to the Mathematics of Finance*, Institute and Faculty of Actuaries
5. Faculty and Institute of Actuaries, *Subject 102*

3. STOCHASTIC MODELLING (25 hours)

Subject structure

1. Principles of actuarial modelling
 - 1.1. Models
 - 1.2. Modelling- the benefits and limitations
 - 1.3. Stochastic and deterministic models
 - 1.4. Discrete and continuous states and time
 - 1.5. Suitability of a model
 - 1.6. Short term and long term properties of a model
 - 1.7. Analyzing the output of a model
 - 1.8. Sensitivity testing
 - 1.9. Communication of the results
2. Stochastic processes
 - 2.1. Definition
 - 2.2. Defining a stochastic process
 - 2.3. Examples of stochastic processes
 - 2.4. Martingales and stopping times
 - 2.5. Investing over a period
3. Markov chains
 - 3.1. The Chapman- Kolmogorov equations
 - 3.2. Time- homogenous Markov chains
 - 3.3. Models
 - 3.4. The long- term distribution of a Markov chain
 - 3.5. Modelling using Markov chains
4. Markov jump processes
 - 4.1. The Poisson process
 - 4.2. Time- homogenous Markov jump processes
 - 4.3. Structure of Markov jump processes
 - 4.4. The time- inhomogeneous case
 - 4.5. Applications
 - 4.6. Numerical methods
 - 4.7. Modelling and simulation
5. Time series
 - 5.1. Properties of a univariate time series
 - 5.2. Stationary random series
 - 5.3. Main linear models of time series
 - 5.4. Filters and the frequency domain
 - 5.5. Compensating for trend and seasonality
 - 5.6. Identification of $MA(q)$ and $AR(p)$ models
 - 5.7. Filtering a time series model using the Box-Jenkins methodology
 - 5.8. Forecasting
 - 5.9. Multivariate time series models

- 5.10. Some special non- stationary and non-linear time series models
- 6. Brownian motion
 - 6.1. Introduction to Brownian motion
 - 6.2. Brownian motion and random walks
 - 6.3. Modelling and simulation
- 7. Diffusion processes
 - 7.1. Diffusions
 - 7.2. Stochastic calculus
 - 7.3. Lévy processes
 - 7.4. Modelling and simulation
- 8. Monte- Carlo simulation
 - 8.1. Generation of pseudo- random numbers using a computer
 - 8.2. Generation of random variates from a specified distribution
 - 8.3. Generation of a series of sets of correlated normal variates
 - 8.4. Disadvantages of using truly random, as opposed to pseudo- random numbers
 - 8.5. Common sets of random numbers vs independent sets of random numbers
 - 8.6. How many simulations to carry out for any particular purpose?

Literature:

- 6. T. Rolski, H. Schmidli, V. Schmidt, J. Teugels, *Stochastic Processes for Insurance and Finance*, Wiley (1990)
- 7. S. I. Resnick, *Adventures in Stochastic Processes*, Birkhäuser, Basel (1992)
- 8. G.R.Grimmett, D.R.Stirzaker, *Probability and Random Processes*, Clarendon Press, Oxford (1992)
- 9. P. J. Brockwell, R. A. Davis, *Time Series: Theory and Methods*, Springer, New York (1987)
- 10. G. E. P. Box, G. M. Jenkins, *Time Series Analysis: Forecasting and Control*, Holden Day, San Francisco (1976)
- 11. D. Lambertson, B. Lapeyre, *Introduction to stochastic calculus applied to finance*, Chapman & Hall (1996)
- 12. International actuarial association, *Stochastic Modelling: Theory and Reality from an Actuarial Perspective* (2010)
- 13. Faculty and Institute of Actuaries, *Subject 103*

4. ECONOMICS (30 hours)

Subject structure

1. Introduction to economics
 - 1.1. The scope of economics
 - 1.2. Ways of solving allocation questions
2. Supply and demand
 - 2.1. Introduction to supply and demand curves
 - 2.2. Demand for a good
 - 2.3. Shifts in demand curves
 - 2.4. Supply of a good
 - 2.5. Shifts in supply curves
 - 2.6. The equilibrium price
 - 2.7. Movements along the curves
 - 2.8. The effects of controls on markets
3. Elasticity
 - 3.1. Definitions of elasticity
 - 3.2. The implications of the elasticity of demand
 - 3.3. Using elasticity to categorize goods
 - 3.4. The factors that affect elasticity
4. Consumer choice
 - 4.1. Consumer choice theory
 - 4.2. Income effect and substitution effects
5. Utility and insurance
 - 5.1. Utility
 - 5.2. Insurance
6. The theory of the firm
 - 6.1. Cost, revenue and profit
 - 6.2. How costs and revenue vary with output
 - 6.3. Profit maximization
 - 6.4. Short-run and long-run effects
7. Market structures
 - 7.1. Monopoly
 - 7.2. Oligopoly
 - 7.3. Monopolistic competition
 - 7.4. Perfect competition
 - 7.5. Market structures
 - 7.6. Perfect markets
8. Public sector finances
 - 8.1. Government expenditure
 - 8.2. Government revenue
 - 8.3. Government revenues – taxes
9. Macroeconomics and economic statistics

- 9.1. Macroeconomics
- 9.2. Issues in the publication of national statistics
- 9.3. Economic activity
- 9.4. Unemployment statistics
- 9.5. Measures of inflation
- 9.6. Foreign trade
- 9.7. Other economic statistics
- 10. National income
 - 10.1. The three methods of measuring of economic activity
 - 10.2. The basic economy
 - 10.3. Economy with investments and savings
 - 10.4. Government expenditure and taxes
 - 10.5. Import and exports
 - 10.6. Property income from abroad
 - 10.7. Depreciation of capital stock
 - 10.8. Real vs. nominal economic activity
 - 10.9. Exchange rates
 - 10.10. Per capita income activity
 - 10.11. Net economic welfare
 - 10.12. Economic activity – conceptual summary and algebraic symbols
 - 10.13. More on the savings/investment relationship
- 11. Keynesian model
 - 11.1. A simple Keynesian model of the economy
 - 11.2. Solving for national income in the simple Keynesian model
 - 11.3. Using the simple Keynesian model
 - 11.4. The accelerator
- 12. The money market and money supply
 - 12.1. What is money?
 - 12.2. How banks create credit
 - 12.3. Controlling the money supply
 - 12.4. The supply and demand curve
 - 12.5. The demand for money
 - 12.6. Money market
- 13. IS – LM model
 - 13.1. The IS and LM curve
 - 13.2. Equilibrium in the IS – LM model
 - 13.3. Determining the output
- 14. Aggregate demand and aggregate supply
 - 14.1. Macroeconomic models
 - 14.2. Specifying the model
 - 14.3. Macroeconomic or aggregate demand
 - 14.4. Aggregate supply
 - 14.5. The classical model
 - 14.6. Monetary and fiscal policy in the classical model
 - 14.7. The classical model in the short-run

- 14.8. A shift in aggregate supply
- 15. Inflation and unemployment
 - 15.1. The quantity theory of money
 - 15.2. Inflation
 - 15.3. Unemployment
 - 15.4. The Phillips curve
- 16. Macroeconomic policy
 - 16.1. Keynesian and Monetarists: areas of disagreement
 - 16.2. The Keynesian and Monetarists approaches
 - 16.3. Fiscal policy
 - 16.4. Monetary policy
 - 16.5. Short-term and long-term interest rate
 - 16.6. Inflation
- 17. International trade
 - 17.1. The importance of international trade
 - 17.2. Absolute and comparative advantages
- 18. Balance of payment
 - 18.1. Introduction
 - 18.2. The balance of payments
 - 18.3. How exchange rate affects the balance of payments
 - 18.4. Measures to correct a balance of payments deficits
- 19. Exchange rates
 - 19.1. Understanding exchange rates
 - 19.2. Determination of the exchange rate
 - 19.3. The effectiveness of macroeconomic policy
 - 19.4. Advantages and disadvantages of floating and fixed exchange rates
 - 19.5. Interest rates and exchange rates
- 20. Economic growth
 - 20.1. Introduction
 - 20.2. The meaning of economic growth
 - 20.3. The factors that lead to growth

Literature

1. Burda, M. and Ch. Wyplosz, *Macroeconomics: a European text*, 2nd edition, Oxford University Press, 1997
2. Nenovski T., *Macroeconomics: Basic principles*, 2nd edition, University American College Skopje, 2010
3. Faculty and Institute of Actuaries, *Subject 107*

5. SURVIVAL MODELS (30 hours)

Subject structure

1. Survival models and the life table
 - 1.1. A simple model of survival
 - 1.2. Complete and curtate expectation of life
 - 1.3. Important formulae
 - 1.4. The life table
 - 1.5. Life table functions at non- integer ages
 - 1.6. Select life tables
 - 1.7. The general pattern of mortality
 - 1.8. Simple laws of mortality
2. Estimating the lifetime distribution
 - 2.1. Censoring mechanisms
 - 2.2. The Kaplan- Maier estimator
 - 2.3. Comparing lifetime distributions
 - 2.4. The Nelson- Aalen estimate
3. The Cox regression model
 - 3.1. Covariates
 - 3.2. Fully parametric models
 - 3.3. The Cox model
 - 3.4. Estimating the regression parameters
 - 3.5. Model fitting
4. The two-state Markov model
 - 4.1. The two-state Markov model
 - 4.2. Probabilities
 - 4.3. Statistics
 - 4.4. The maximum likelihood estimator
5. The general Markov model
 - 5.1. The general Markov model
 - 5.2. Probabilities
 - 5.3. Observations
6. Binomial and Poisson models
 - 6.1. Binomial- type models
 - 6.2. The actuarial estimate
 - 6.3. Poisson models
 - 6.4. Comparison of multiple state, binomial and Poisson models
7. Graduation and statistical tests
 - 7.1. Comparison with another experience
 - 7.2. Graduation
 - 7.3. Reasons for graduation
 - 7.4. Desirable features of graduation
 - 7.5. Testing the smoothness of graduation

- 7.6. Statistical test of a mortality experience
- 8. Methods of graduation
 - 8.1. Graduation by parametric formula
 - 8.2. Graduation by reference to a standard table
 - 8.3. Graphical graduation
 - 8.4. Comparison of different methods
 - 8.5. Statistical tests of a graduation
 - 8.6. The effect of duplicate policies
- 9. Exposed to risk
 - 9.1. Homogeneity
 - 9.2. The principle of correspondence
 - 9.3. Exact calculation of E_x^c
 - 9.4. Census approximation to E_x^c
 - 9.5. Different distributions to age
 - 9.6. Calendar year rate intervals
 - 9.7. Policy year rate intervals
- 10. Evaluation of assurances and annuities
 - 10.1. Life insurance contracts
 - 10.2. Pricing of life insurance contracts
 - 10.3. Whole of life assurance contracts
 - 10.4. Term assurance contracts
 - 10.5. Pure endowment contracts
 - 10.6. Endowment assurance contracts
 - 10.7. Life annuity contracts
 - 10.8. Relationships among EPVs of benefits
 - 10.9. Premium conversion equations
 - 10.10. Variances of annuity benefits
 - 10.11. Deferred annuities and assurances
 - 10.12. Assurance functions
 - 10.13. Continuous annuities
 - 10.14. Commutation functions
 - 10.15. Assurances paid immediately on death
 - 10.16. Retrospective accumulations
- 11. Premiums and reserves
 - 11.1. Premium paid
 - 11.2. The net premium
 - 11.3. The office premium
 - 11.4. The insurer's loss random variable
 - 11.5. Reserves
 - 11.6. Policy values
 - 11.7. Retrospective policy values
 - 11.8. Net premium policy values
 - 11.9. Recursive calculation of policy values
 - 11.10. Mortality profit
 - 11.11. Thiele's differential equation

Literature:

1. H.U. Gerber, *Life Insurance Mathematics*, Springer-Verlag Berlin Heidelberg and Swiss Association of Actuaries Zürich, 1990.
2. Chin Long Chiang, *Introduction to Stochastic Processes in Biostatistics*, Wiley, 1968.
3. N.L Bowers et al., *Actuarial Mathematics*, 2nd edition, Society of Actuaries, 1997.
4. S. Haberman, E. Pitacco, *Actuarial Models for Disability Insurance*, Chapman & Hall, 1999.
5. E. Marubini, M.G. Valsecci, M. Emmerson, *Analysing Survival Data from Clinical Trials and Observational Studies*, Wiley, 1995.
6. B. Benjamin, J.H. Pollard, *The Analysis of Mortality and Other Actuarial Statistics*, 3rd edition, Institute of Actuaries and Faculty of Actuaries, 1993.
7. R.C. Elandt-Johnson, N.L. Johnson, *Survival Models and Data Analysis*, Wiley, 1980.
8. Faculty and Institute of Actuaries, *Subject 104*

6. ACTUARIAL MATHEMATICS 1 (30 hours)

Subject structure

1. Annuities and assurances involving two lives
 - 1.1. Random variables to describe joint life functions
 - 1.2. Determining simple probabilities involving two lives
 - 1.3. Determining present values involving two lives
 - 1.4. Contingent and reversionary functions
 - 1.5. Present values of functions with specified terms
2. Definition and use of select mortality functions
 - 2.1. Select mortality rates and their estimation
 - 2.2. The select life table
 - 2.3. Applications
3. Variable benefit and other contracts
 - 3.1. Variable benefit contracts
 - 3.2. Net future loss random variable for variable benefit contracts
 - 3.3. Determining net prospective reserves
4. Expenses and bonuses
 - 4.1. Types of expenses incurred in writing a life insurance contract
 - 4.2. The influence of inflation on expenses
 - 4.3. Bonuses on with profit contracts
5. Gross premiums and reserves
 - 5.1. Gross future loss random variable for standard contracts
 - 5.2. Gross premiums
 - 5.3. Expected present values of annuities payable m times a year
 - 5.4. Gross premium reserves
 - 5.5. Relationships involving the reserves
6. Profit testing
 - 6.1. Unit-linked contracts
 - 6.2. Evaluating expected cash flows
 - 6.3. Profit tests for annual premium contracts
 - 6.4. Determining premiums using a profit test
7. Applications of cash flow projection
 - 7.1. Reserving using cash-flow techniques
 - 7.2. Actuarial funding for unit-linked contracts
 - 7.3. Pricing and reserving bases
8. Multiple decrement and pension funds
 - 8.1. Multiple decrement service tables for pensions calculations
 - 8.2. Multiple decrement theory
 - 8.3. Salary-related pensions benefits and contributions
9. Asset shares
 - 9.1. Determining asset share
 - 9.2. Asset share and retrospective reserve

- 9.3. Asset share and bonus distribution
- 10. Alterations
 - 10.1. Surrender values for conventional insurance contracts
 - 10.2. Paid-up sums assured for conventional contracts
 - 10.3. Using policy values to evaluate the financial effect of alterations to policies
 - 10.4. Benefits and options available to an individual leaving a pension scheme
 - 10.5. Calculation of transfer cash equivalent for an individual leaving a pension scheme
- 11. Options and Guarantees
 - 11.1. Investment guarantees
 - 11.2. Mortality options
- 12. Mortality selection and standardization
 - 12.1. Principal factors contributing to variation in mortality and morbidity
 - 12.2. Selection in life assurance and pension business
 - 12.3. Why it is necessary to have different mortality tables for different classes of lives
 - 12.4. How decrements can have a selective effect
 - 12.5. Risk classification in life insurance
 - 12.6. Use of single figure indices to summarize and compare mortality levels
 - 12.7. Single figure indices
- 13. Estimation of select mortality rates
 - 13.1. Estimating the transition intensities
- 14. Population projection
 - 14.1. Simple mathematical models of population projection
 - 14.2. The component method of population projection
 - 14.3. Fertility rates
- 15. Disability benefits
 - 15.1. Valuing disability benefits using a multiple state model
 - 15.2. Valuing disability benefits using rates of claim inception and claim termination
 - 15.3. "Manchester-Unity" approach to disability

Literature

1. H.U. Gerber, *Life Insurance Mathematics*, Springer-Verlag Berlin Heidelberg and Swiss Association of Actuaries Zürich (1990)
2. N.L Bowers et al., *Actuarial Mathematics*, 2nd edition, Society of Actuaries (1997)
3. B. Benjamin, J.H. Pollard, *The Analysis of Mortality and Other actuarial Statistics*, 3rd edition, Institute of Actuaries and Faculty of Actuaries (1993)
4. A. Neill, *Life contingencies*, Heinemann (1977)
5. P.M. Booth et al., *Modern actuarial theory and practice*, Chapman & Hall (1999)
6. Faculty and Institute of Actuaries, *Subject 105*

7. ACTUARIAL MATHEMATICS 2 (30 hours)

Subject structure

1. Bayesian statistics
 - 1.1. Bayes' theorem
 - 1.2. Prior and posterior distributions
 - 1.3. The loss function
2. Loss distributions
 - 2.1. MGFs and basic loss distributions
 - 2.2. Other loss distributions
 - 2.3. Estimation
 - 2.4. Goodness-of-fit-tests
 - 2.5. Mixture distributions
3. Reinsurance
 - 3.1. Reinsurance arrangements
 - 3.2. Particular distributions
 - 3.3. Inflation
 - 3.4. Estimation
 - 3.5. Policy excess
4. Risk models
 - 4.1. Models for short term insurance contracts
 - 4.2. The collective risk model
 - 4.3. Aggregate claim distributions under proportional and excess of loss reinsurance
 - 4.4. Exact and approximate calculation of $G(x)$ for the collective risk model
 - 4.5. The individual risk model
 - 4.6. Parameter variability/uncertainty
5. Ruin theory
 - 5.1. Basic concepts
 - 5.2. The Poisson and compound Poisson process
 - 5.3. The adjustment coefficient and Lundberg's inequality
 - 5.4. The effect of changing parameter values on finite and infinite time ruin probabilities
 - 5.5. Reinsurance and ruin
6. Credibility theory
 - 6.1. Credibility
 - 6.2. Bayesian credibility
 - 6.3. Empirical Bayes credibility theory: Model 1
 - 6.4. Empirical Bayes credibility theory: Model 2
 - 6.5.
7. Experience rating
 - 7.1. Definition of no claims discount systems
 - 7.2. Steady state analysis
 - 7.3. The effect of NCD systems on the propensity to claim

8. Run-off triangles
 - 8.1. Projections using development factors
 - 8.2. Adjusting for inflation
 - 8.3. The average cost per claim method
 - 8.4. Loss ratios
 - 8.5. The Bornhuetter- Ferguson method
9. Generalized linear models
 - 9.1. Exponential families
 - 9.2. Link functions and linear predictors
 - 9.3. Deviance of model fitting
 - 9.4. Residuals analysis and assessment of model fit

Literature

1. C. D. Daykin, T. Pentikäinen, M. Pesonen, *Practical risk theory for actuaries*, Chapman & Hall, London (1994)
2. T.Rolski, H.Schmidli, V.Schmidt, J.Teugels, *Stochastic processes for Insurance and Finance*, Wiley (1998)
3. E. De Vylder, *Advanced Risk Theory: A Self-Contained Introduction*,
4. H. Bühlmann, *Mathematical methods in risk theory*, Springer, Heidelberg (1970)
5. N.Bowers et al., *Actuarial Mathematics*, 2nd edition, Society of Actuaries (1997)
6. R. V. Hogg, S. A. Klugmann, *Loss distributions*, Wiley, New York (1984)
7. H.-P. Schmidli, *Risk theory*, Unpublished lecture notes
8. M. Denuit et al., *Actuarial modeling of claim counts* , Willey (2007)
9. Faculty & Institute of Actuaries, *Subject 106*

8. INVESTMENTS AND ASSET MANAGEMENT (30 hours)

Subject structure

1. Asset classes
 - 1.1. Fixed income (bonds, treasury bills, etc.)
 - 1.2. Equity
 - 1.3. Real estate
 - 1.4. Derivatives
 - 1.5. Alternative investments
 - 1.6. Investment funds
2. Capital markets
 - 2.1. Types and size of various financial (primary/secondary) markets/trading
 - 2.2. Capital market participants
 - 2.3. Liquidity
 - 2.4. Factors influencing capital markets
 - 2.5. Capital markets as a barometer
 - 2.6. Macedonian capital market
3. Risk
 - 3.1. Definition of risk (possible definitions)
 - 3.2. Historical data on return and risk of various asset classes
4. Modern portfolio theory
 - 4.1. Portfolio theory
 - 4.2. Benefits of diversification
 - 4.3. Principles and basic results of modern portfolio theory
 - 4.4. Models of asset pricing
 - 4.5. Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT)
 - 4.6. Efficient market hypothesis (EMH)
5. Valuation of financial instruments
 - 5.1. The analysis and valuation of bonds
 - 5.2. Equity
 - 5.3. Real estate
 - 5.4. Derivative instruments
6. Institutional investors
 - 6.1. Classification of institutional investors (by type, size, etc.)
 - 6.2. Goals and strategies of investments (passive/active, etc.)
 - 6.3. Asset allocation principles
7. Individual investors
 - 7.1. Goals and strategies of investment (passive/active, etc.)
 - 7.2. Main factors influencing investment strategies
 - 7.3. Advantages of investing in collective investment schemes
8. Actuarial techniques
 - 8.1. Relationship between returns on asset classes
 - 8.2. Actuarial risk

- 8.3. Financial risks
- 8.4. Asset pricing models
- 8.5. Asset / liability modeling
- 8.6. Asset / liability mismatch reserving
- 8.7. Credit rating
- 8.8. Liability hedging
- 8.9. Co-integration
- 8.10. Dynamic liability benchmarks
- 9. Investment performance measurement
 - 9.1. Comparison between different methods of calculating returns
 - 9.2. Investment costs
- 10. Regulatory and tax aspects and other restrictions
 - 10.1. Regulatory aspects
 - 10.2. Possible tax aspects
 - 10.3. Other restriction

Literature

1. Frank K. Reilly and Keith C. Brown, *Investment Analysis and Portfolio Management*, 6th edition, Thomson Learning, 2000
2. Jaffe, J., Ross S. A., Westerfield, R. W., *Corporate Finance*, 5th edition, New York: McGraw-Hill, 2000
3. John C. Hull, *Fundamentals of futures and options markets*, 4th edition, Prentice Hall, 2002
4. Faculty and Institute of Actuaries, *Subject 301*

9. LIFE INSURANCE (30 hours)

Subject structure

1. The actuarial control cycle
2. Life insurance products
 - 2.1. Endowment assurances
 - 2.2. Fixed term contracts
 - 2.3. Whole life assurances
 - 2.4. Term assurances
 - 2.5. Convertible or renewable assurances
 - 2.6. Immediate annuity contracts
 - 2.7. Deferred annuity contracts
 - 2.8. Long-term sickness insurance contracts
 - 2.9. Critical illness contracts
 - 2.10. Long term care contracts
 - 2.11. Unit-linked contracts
 - 2.12. Indexed-linked contracts
3. With profit surplus distribution
 - 3.1. Distribution of profits
 - 3.2. Additions to benefits approach
 - 3.3. Revalorization method
 - 3.4. Contribution method dividends
 - 3.5. Bonus methods
4. General business environment
 - 4.1. The main distribution channels
 - 4.2. The effect of different channels
 - 4.3. Distribution channels and the actuarial control cycle
 - 4.4. Effect of the regulatory regime
 - 4.5. The fiscal regime
 - 4.6. Professional guidance
5. Risk
 - 5.1. Policy and other data
 - 5.2. Mortality, critical illness and sickness rates
 - 5.3. Investment performance
 - 5.4. Expenses, including the effect of inflation
 - 5.5. Withdrawals
 - 5.6. The mix of new business
 - 5.7. The volume of new business
 - 5.8. Guarantees and options
 - 5.9. Competition
 - 5.10. The management of the company
 - 5.11. Counterparties under reinsurance arrangements
 - 5.12. The aims of the company and of the actuary

- 5.13. The problems to which the risks give rise
- 6. Models in life insurance
 - 6.1. Objectives and requirements
 - 6.2. Basic features of a model
 - 6.3. The uses of models
 - 6.4. Sensitivities
- 7. Checking policy data
 - 7.1. Data reconciliation checks
 - 7.2. Consistency checks
 - 7.3. Unusual values and spot checks
 - 7.4. Analysis of surplus and embedded value profit
- 8. Product design
 - 8.1. Factors in product design
 - 8.2. Interaction of product design factors
- 9. Setting assumptions
 - 9.1. Pricing life insurance contracts
 - 9.2. Profit requirement
 - 9.3. Valuing life insurance contracts for the purpose of determining reserves
 - 9.4. Valuing life insurance contracts for the purpose of determining the profitability of existing business
 - 9.5. Consistency
- 10. Discontinuance terms
 - 10.1. Payment of a lump sum
 - 10.2. Conversions to paid-up status
- 11. Supervisory reserves
 - 11.1. Gross premium valuation method
 - 11.2. Net premium valuation method
 - 11.3. Asset valuation
 - 11.4. The principles of setting reserves
 - 11.5. Reserving vs pricing assumptions
 - 11.6. Sensitivity analysis
- 12. Investment
 - 12.1. Asset characteristics
 - 12.2. The principles of investment
 - 12.3. Asset-liability matching requirements
 - 12.4. Developing an appropriate investment strategy
- 13. Assessment of on-going solvency
 - 13.1. Assessing solvency
 - 13.2. The reasons for projecting solvency
- 14. Reinsurance
 - 14.1. The main types of reinsurance contracts
 - 14.2. The reasons for reinsuring
 - 14.3. Specifying the amount to be reinsured
 - 14.4. Facultative and treaty
 - 14.5. Determination of the retention level

- 15. Underwriting
 - 15.1. Managing risk
 - 15.2. The process of underwriting
- 16. Profit distribution and risk
 - 16.1. Margins for future adverse experience
 - 16.2. Business objectives of the company
 - 16.3. Policyholder expectations
 - 16.4. Provision of capital
 - 16.5. Profit distribution strategies
- 17. Feedback into the control cycle
 - 17.1. Reasons for monitoring experience
 - 17.2. Data required
 - 17.3. Analysis of experience
 - 17.4. The analysis of surplus/profit
 - 17.5. Using the results

Literature:

1. Black, Kenneth Jr, Harold D Skipper Jr., *Life insurance* (12th edition) Englewood Cliffs, NJ, Premier Hall
2. Booth P, et al., *Modern actuarial theory and practice*, (2nd edition), Chapman & Hall/CR0043 , ISBN 1-58488-368-5
3. Faculty and Institute of Actuaries, *Subject 302*

10. NONLIFE INSURANCE (30 hours)

Subject structure

1. Insurance companies
 - 1.1. Introduction to general insurance
 - 1.2. A general insurer's balance sheet
 - 1.3. Technical reserves
 - 1.4. Free reserves
 - 1.5. Investments
 - 1.6. Profitability and cash flows
 - 1.7. Reinsurance
2. The actuarial control cycle
 - 2.1. Actuarial applications in general insurance
 - 2.2. Professionalism
3. Insurance products
 - 3.1. General insurance principles
 - 3.2. Types of cover and types of product
 - 3.3. Liability
 - 3.4. Property damage
 - 3.5. Financial loss
 - 3.6. Fixed benefits
 - 3.7. Exclusions
 - 3.8. How does the insurer's risk vary by class
 - 3.9. Capital requirements and impact on solvency
4. Tackling an unusual product
5. Reinsurance products
 - 5.1. Types of reinsurance
 - 5.2. Quota Share
 - 5.3. Surplus reinsurance
 - 5.4. Excess of loss reinsurance
 - 5.5. Stop Loss
 - 5.6. Financial reinsurance
6. General insurance markets
 - 6.1. The major providers
 - 6.2. Marketing strategies
 - 6.3. Regulatory and fiscal regimes
 - 6.4. Professional guidance
7. Risk and uncertainty
 - 7.1. Areas of risk and uncertainty for general insurers
 - 7.2. Elements of risk and uncertainty
 - 7.3. The implications of a low solvency margin
8. Data
 - 8.1. Uses and users of data

- 8.2. Quality and quantity of data
- 8.3. Industry-wide data collection schemes
- 8.4. Risk classification and reduction of heterogeneity
- 8.5. Establishing a good information system
- 8.6. Errors, omissions or distortions in claims data
- 8.7. Effects of inadequate data on pricing and reserving
- 9. Actuarial investigations
 - 9.1. Reserving investigations
 - 9.2. Rating investigations
 - 9.3. Investment and Capital
 - 9.4. Reinsurance requirements
 - 9.5. Other investigations
- 10. Outstanding claims reserves
 - 10.1. Data requirements
 - 10.2. Case by case basis
 - 10.3. Statistical methods
 - 10.4. The basic chain ladder method
 - 10.5. The inflation adjusted chain ladder method
 - 10.6. The average cost per claim (ACPC) method
 - 10.7. Loss ratios
 - 10.8. The Bornhuetter-Ferguson (B-F) method
 - 10.9. Identifying potential data problems and likely causes
- 11. Reserves for IBNR and unexpired risks
 - 11.1. Estimating IBNR
 - 11.2. Reserving for claim expenses
 - 11.3. Reserves for unexpired policies
- 12. Reserving bases
 - 12.1. The different reasons for calculating reserves
 - 12.2. The assumptions that might be appropriate
 - 12.3. Comparison with rating assumptions
 - 12.4. Choice of methods
 - 12.5. Allowance for future inflation
 - 12.6. Discounting
 - 12.7. The likely sources of uncertainty
- 13. Premium rating
 - 13.1. The risk premium
 - 13.2. Data for pricing
 - 13.3. Adjusting for trends
 - 13.4. Adjustments for other loadings
 - 13.5. Experience-rating systems
- 14. Rating basis
 - 14.1. Return on capital
 - 14.2. Underwriting considerations
 - 14.3. Reinsurance considerations
 - 14.4. Investment

- 14.5. Policy conditions
- 14.6. The renewal process
- 14.7. Expenses
- 14.8. Premium rating bases
- 15. Reinsurance applications
 - 15.1. Reinsurance: what types and how much?
 - 15.2. Determination of appropriate reinsurance
- 16. Modeling for financial planning
 - 16.1. Uses of modeling
 - 16.2. What makes a good model?
 - 16.3. A deterministic approach for modeling
 - 16.4. A stochastic approach to modeling
- 17. Investment
 - 17.1. Matching
 - 17.2. The effect of the free reserves on asset selection
 - 17.3. Non-investible funds
 - 17.4. The influence of the supervisory authorities on investment policy
- 18. Asset-liability modeling
 - 18.1. Liability outgo
 - 18.2. Estimating the investment income in future time periods
 - 18.3. The relationship between an insurer's liabilities and assets
 - 18.4. Sensitivity of cash flows results to changes in assumptions
 - 18.5. Solvency requirements
- 19. Accounting principles
 - 19.1. One-year accounts
 - 19.2. True underlying profitability and apparent profit
 - 19.3. Constructing accounts
- 20. Interpreting accounts
 - 20.1. Accounting principles
 - 20.2. Interpreting accounts
 - 20.3. Key values and ratios
 - 20.4. Interpreting the features of a set of accounts
- 21. Claims analysis
 - 21.1. Claims and exposure
 - 21.2. Analyzing claims for product pricing
 - 21.3. Adjustments to claims data
 - 21.4. Grouping data
 - 21.5. Analysis of claims experience
 - 21.6. Claims distributions
- 22. Other analysis
 - 22.1. Portfolio movements
 - 22.2. Expense analysis
 - 22.3. Analysis of persistency and profitability by source
 - 22.4. Applications of experience analysis

Literature:

1. D.G. Hart, R.A. Buchanan, B.A. Howe and Institute of Actuaries of Australia, *The actuarial practice of general insurance*, Sydney (1996)
2. Booth P, et al., *Modern actuarial theory and practice*, (2nd edition), Chapman & Hall/CR0043, ISBN 1-58488-368-5
3. Faculty and Institute of Actuaries, *Subject 303*

11. PENSION INSURANCE (25 hours)

Subject structure

1. Introduction and principal terms
2. Pension insurance: participants and principles
 - 2.1. Insurers
 - 2.2. State stimulation, regulation and supervision
 - 2.3. Insured persons
 - 2.4. Financing of pension benefits. PAYG and fully funded pension insurance
3. PAYG pension systems
 - 3.1. General characteristics
 - 3.2. Basic characteristic of first pillar in Macedonian pension system
4. Fully funded pension insurance
 - 4.1. Type of insurance
 - 4.2. Principles of insurance
 - 4.3. Financing of insurance
 - 4.4. Investment
5. Defined benefits pension schemes
 - 5.1. Design of schemes
 - 5.2. Financing methods
 - 5.3. Actuarial base: Mortality tables and economic assumption
 - 5.4. Present value of pension benefits
6. Defined contribution pension schemes
 - 6.1. General characteristics
 - 6.2. Present values of annuities. Woolhouse formula
 - 6.3. Reform in pension system in Chile – brief overview
 - 6.4. Basic characteristic of second and third pillar in Macedonian pension system
7. Actuarial valuations techniques
 - 7.1. Demographic projections: data, actuarial bases, the transition probability, formula
 - 7.2. Financial projections: data, actuarial base, formula
8. Asset-liability matching
9. Pension system in Macedonia
 - 9.1. Introduce
 - 9.2. Origins and development of the pension system in Macedonia
 - 9.3. Reforms
 - 9.4. Legal framework
 - 9.5. Structure of reformed pension system
 - 9.6. Principles and rules for membership and contribution
 - 9.7. Pension payout product from second and third pillar
 - 9.8. Institutions in pension system
 - 9.9. Actuaries in pension system
 - 9.10. Recent developments in pension system

Literature:

1. C. D. Daykin, T. Pentikäinen, M. Pesonen, *Practical risk theory for actuaries*, Chapman and Hall, London (1994)
2. S. N. Iyer, *Actuarial mathematics of social security pensions*, ILO, Geneva (1999)
3. E. M. Lee, *An introduction to pension schemes*, Institute and Faculty of Actuaries, Oxford (1986)
4. World Bank, *Averting the old age crisis: policies to protect the old and promote growth*, Oxford University Press, New York (1994)
5. Institute and Faculty of Actuaries, *Subject 304 Core Reading*
6. Valid and applicable laws –
 - *Law on pension and disability insurance*
 - *Law on mandatory fully funded pension insurance*
 - *Law on voluntary fully funded pension insurance*
 - *Law on payment of pensions and pension benefits from fully funded pension insurance*

12. HEALTH INSURANCE (25 hours)

Subject structure

1. Health care and health insurance
 - 1.1. Health care
 - 1.2. Health insurance
 - 1.3. Historical development of health insurance
 - 1.4. Health insurance, purpose and goals
2. Health and care insurance products
 - 2.1. Critical illness insurance
 - 2.2. Income protection insurance
 - 2.3. Long term care insurance
 - 2.4. Major medical expenses
 - 2.5. Private medical insurance
 - 2.6. Group and individual covers
3. Product design
 - 3.1. Customer attraction and clarity
 - 3.2. Insurer control and profitability
 - 3.3. Regulator's satisfaction
 - 3.4. Employer as purchaser
 - 3.5. Private medical insurance
4. The general business environment
 - 4.1. Distribution channels
 - 4.2. Regulatory and fiscal regimes
 - 4.3. Professional guidance
 - 4.4. Inflation
 - 4.5. Other economic influences
5. State healthcare provision
 - 5.1. Objectives
 - 5.2. Manner of state provision
 - 5.3. Legislation
6. Product pricing
 - 6.1. Data availability
 - 6.2. Competitiveness
 - 6.3. Regulatory constraints
 - 6.4. Reinsurance impact on pricing
7. Setting assumptions
 - 7.1. General considerations when setting assumptions
 - 7.2. Pricing health and care insurance products
 - 7.3. Valuing insurance contracts
8. Reserves: supervisory and management
 - 8.1. The role of statistical and case estimates
 - 8.2. The principles of setting statutory or solvency reserves

- 8.3. Statutory reserving vs pricing assumptions
- 8.4. Solvency requirements
- 8.5. Best estimate reserves
- 8.6. Types of reserves
- 9. Nature of risks
 - 9.1. The sources of risks
 - 9.2. The problems to which the risks gives rise
 - 9.3. Other sources of risks
 - 9.4. Product specific risks and capital to meet them
- 10. Reinsurance products and risk management
 - 10.1. Reasons for reinsurance
 - 10.2. Reinsurance business
- 11. Other risk management techniques
 - 11.1. Review actual experience against pricing bases
 - 11.2. Checks on policy and claims data
 - 11.3. Surveys on customer service satisfaction
 - 11.4. Underwriting
 - 11.5. Claims management
 - 11.6. Policyholders reasonable expectations
 - 11.7. Controlling the distribution process
- 12. Models in health and care insurance
 - 12.1. Objectives and requirements
 - 12.2. Basic features of a model
 - 12.3. The uses of models
 - 12.4. Model points, parameter values and sensitivities
- 13. Monitoring and feedback into the control cycle
 - 13.1. Reasons for monitoring experience
 - 13.2. Data required
 - 13.3. Analysis of experience
 - 13.4. The analysis of surplus/profit
 - 13.5. Using the results
- 14. Compulsory and voluntary health insurance in MK
 - 14.1. Overview
 - 14.2. Types of compulsory health insurance
 - 14.3. Types of voluntary health insurance
 - 14.4. Regulatory framework
 - 14.5. Health insurance fund in MK
 - 14.6. The role of the Ministry of health
 - 14.7. Insured's structure
 - 14.8. General business environment for health and care insurers in the MK.

Literature:

1. Sigma No 2/1998; *Health Insurance in the United States: An Industry in Transition*; Swiss Reinsurance Company Economic Research; 1998; Zurich
2. Sigma No 6/1998; *Life and health insurance markets benefit from reforms in state pension and health systems*; Swiss Reinsurance Company Economic Research; 1998; Zurich
3. S.T. Sonnefeld, D.R. Waldo, J.A. Lemieux, D.R. McKusick; *Projections of national health expenditures through the year 2000*; Health Care Financing Review, Volume 13, Number 1; 1991
4. R.H. Arnett III, D.R. McKusick, S.T. Sonnefeld, C.S. Cowell; *Projections of health care spending to 1990*; Health Care Financing Review; Volume 7, Number 3; 1986
5. Swiss Re Life & Health, *Profitable Health Insurance*, Seminar 2-3.9.1999.

13. ACCOUNTING AND FINANCIAL STATEMENTS (20 hours)

Subject structure

1. Accounting
 - 1.1. Definitions
 - 1.2. Conceptual framework for financial reporting
 - 1.3. Legal framework
 - 1.4. Principles
 - 1.5. Assumptions
 - 1.6. Purpose, needs, etc.
2. Users of accounting information (government and agencies, management, shareholders, investors, employees, general public, etc.)
3. Comparison of Financial, Management, and Cost Accounting
 - 3.1. Financial accounting
 - 3.2. Management accounting
 - 3.3. Cost accounting
4. Bookkeeping
 - 4.1. Accounting event
 - 4.2. Principle of double-entry bookkeeping
5. Legal framework
 1. Legal framework in EU,
 2. Legal framework in MK
 - Company Law
 - Rulebook on accounting
6. Chart of accounts
 - 6.1. Uniform classification of accounts
7. Basic financial statements
 - 7.1. Balance sheet and related information
 - 7.2. Income statement and related information
 - 7.3. Cash flow statement
 - 7.4. Statement of changes in equity
 - 7.5. Notes to the financial statements
8. International accounting standards
 - 8.1. IFRS and changes in financial reporting
 - 8.2. IFRS 4 and IFRS 19
 - 8.3. Other standards
9. Accounting policies
 - 9.1. Revenue recognition from life and non-life insurance premium
 - 9.2. Recognition of income and expenses from investments
 - 9.3. Recognition of expenses from claims
 - 9.4. Recognition of acquisition cost and management expenses
 - 9.5. Recognition of depreciation of tangible and intangible assets
 - 9.6. Valuation of investments

- 9.7. Valuation of receivables
- 9.8. Creation of technical reserves
- 10. Assets
 - 10.1. Financial assets
 - 10.2. Reclassification – financial assets
 - 10.3. Receivables
 - 10.4. Other
- 11. Liabilities
 - 11.1. Capital
 - 11.2. Reserves (technical, mathematical)
- 12. Structure of balance sheet
- 13. Revenue recognition
 - 13.1. Premiums and revenue recognition from premiums and the relation with balance sheet
 - 13.2. Investment income
- 14. Recognition of expenses
 - 14.1. Claims
 - 14.2. Acquisition costs
 - 14.3. Investment related expenses
- 15. Result from operating activities
- 16. Quality of financial statements
- 17. Financial indicators
 - 17.1. Solvency
 - 17.2. Efficiency
 - 17.3. Liquidity
 - 17.4. Profitability
- 18. Insurance contracts
 - 18.1. Definition of risk
 - 18.2. Importance of risk
 - 18.3. Definition of contracts
 - 18.4. Practical examples
- 19. Liability Adequacy Test (LAT)
- 20. Presentation and reporting on
 - 20.1. Capital adequacy
 - 20.2. Equity of insurance company
 - 20.3. Assets used for covering technical reserves
- 21. Insurance industry in Macedonia
 - 21.1. Size, trends, indicators, etc.

Literature

1. Ralph S. Blanchard III, *Basic Insurance Accounting- Selected Topics*, CAS Study Note (2007)
2. International Accounting Standards (IAS)
3. International Financial Reporting Standards (IFRS)
4. Valid and applicable secondary regulation in insurance in Macedonia:
 - *Rulebook on accounting*
 - *Rulebook on chart of accounts for insurance and reinsurance undertakings*
 - *Rulebook on the methods of evaluation of items on the balance sheets and preparation of financial reports*
 - *Rulebook on the form and content of the Report on evaluation of items on the balance sheets*
 - *Rulebook on the form and the content of the balance schemes and detailed content of the annual reports of the insurance and/or reinsurance undertakings*
 - *Rulebook on the types and description of items to be considered when calculating the capital of the insurance and/or reinsurance of undertakings*

14. LAW, LEGISLATION AND REGULATION (20 hours)

Subject structure

1. Law and regulation – general terms
 - 1.1 Term and basic elements of law
 - 1.2 Legal norm, type and content of legal norm,
 - 1.3 Legal relations, legal institutions, legal branches, legal areas and legal systems
2. General knowledge of law of contract
 - 2.1. Offer, acceptance of offer, concluding of contracts
 - 2.2. Types of contracts, accomplishing of contracts
 - 2.3. Rights and obligations of contracting parties
 - 2.4. Termination of contracts
3. General knowledge of companies
 - 3.1. Company - term, types and dividing of companies
 - 3.2. Constituting, organization, managing and representation of companies
 - 3.3. Joint stock companies, shareholding and shareholder rights
4. General knowledge for termination of joint stock companies
 - 4.1. Liquidation
 - 4.2. Insolvency
 - 4.3. Authorities of liquidation and insolvency procedure
5. Insurance in general as professional activity
 - 5.1. Terms related to insurance
 - 5.2. Cultures and traditions of insurance
 - 5.3. Technical organization of insurance
 - 5.4. Organization of insurance as activity
 - 5.5. Term(s) of insurance
 - 5.6. Insurance as business grip and social insurance
 - 5.7. Sources of insurance right
 - 5.8. Types of insurance
 - 5.9. Insurance and reinsurance pulls
 - 5.10. European sources of insurance rights
 - 5.11. Solvency II regulation
6. Insurance contracts
 - 6.1. Insurance contracts, terms and elements
 - 6.2. Regulations and obligations of contracting parties regarding insurance contracts
7. Basic knowledge of claim
 - 7.1. Claim, terms and types of claim
 - 7.2. Compensation of claim
8. Extracts from relevant articles from Law on supervision of insurance connected to establishment, organization, working, managing and termination of insurance joint stock companies
9. International structures and legislative instruments
 - 9.1. Purpose of international structures

- 9.2. Understanding variations in country cultures
- 9.3. Structure within the EU
- 9.4. Relevant EU legislation

Literature:

1. Šulejić Ž. P., *Law on Insurance*, Misao, Novi Sad, 1992
2. Čolović V., *Insurance companies: National legislation, Regulation in EU, Comparative law*; Institute of Comparative Law, Belgrade, 2010
3. Nikolovski A. and Petruseva N., *Economics of Insurance*, FON University Skopje, 2011

Valid and applicable laws in Macedonia:

1. *Law on insurance supervision*
2. *Law on mandatory fully funded pension insurance*
3. *Law on voluntary fully funded pension insurance*
4. *Law on payment of pensions and pension benefits from fully funded pension insurance*
5. *Law on trade companies*
6. *Law on securities*
7. *Law on takeover of joint stock companies*
8. *Law on Obligations*
9. *Bankruptcy Law*
10. *National Qualification of Activities*

Valid and applicable secondary regulation in insurance in Macedonia:

1. *Rulebook on chart of accounts for insurance and reinsurance undertakings*
2. *Rulebook on the methods of evaluation of items on the balance sheets and preparation of financial reports*
3. *Rulebook on the form and content of the Report on evaluation of items on the balance sheets*
4. *Rulebook on the layout and the contents of the auditor's report and minimum scope of audit of insurance and reinsurance undertakings*
5. *Rulebook on the form and the content of the balance schemes and detailed content of the annual reports of the insurance and/or reinsurance undertakings*
6. *Rulebook on minimum standards for calculation of technical provisions*
7. *Rulebook on calculation of the required level of solvency margin*
8. *Rulebook on the types and description of items to be considered when calculating the capital of the insurance and/or reinsurance of undertakings*
9. *Rulebook of the calculation method of the liquidity ratio and the minimal liquidity*
10. *Rulebook on the types and characteristics of the assets covering technical provisions and the assets covering mathematical reserve, as well as detailed placement and limitation on these investments, and their valuation*

11. *Rulebook for the adequacy of reinsurance coverage, methods for calculating the amount of maximum coverage by the insurance companies in the table for maximum coverage, and the method for calculating the maximum possible claim*
12. *Rulebook of the detailed content of the appointed actuary's report*
13. *Rulebook on the statistical insurance standards of the insurance and/or reinsurance undertakings*
14. *Rulebook of the minimum contents of records and the manner of reporting, reserving and liquidating the claims by the insurance companies*
15. *Rulebook on the contents of regular notifications that insurance and/or reinsurance undertakings and other persons submit to Insurance supervision agency pursuant to the Law on insurance supervision*
16. *Rulebook of the minimum standards of the information systems of the insurance undertakings*
17. *Rulebook on the basic procedures, rules and methods for carrying insurance supervision*
18. *Rulebook of the rules of the Actuarial profession*

Valid and applicable secondary regulation in fully funded pension insurance in Macedonia:

1. *Rulebook for report with opinion of the appointed actuary*
2. *Rulebook for the rules and minimum standards for determination of mortality tables*
3. *Rulebook for the rules and minimum standards for determination of interest rates*
4. *Rulebook for the method of projection of the pensions and the amount on the individual accounts for programmed withdrawals*

15. PROFESSIONALISM AND ETHICS (10 hours)

Subject structure

1. Actuarial profession
 - 1.1. Characteristic of profession
 - 1.2. Special skills and training
 - 1.3. Continuous training and development
 - 1.4. Quality advices
 - 1.5. Independency of the opinion
 - 1.6. Objectivity, integrity and reliability
2. A brief history of actuarial profession
 - 2.1. In the world
 - 2.2. In Macedonia
3. Actuarial education
4. Actuarial Associations
 - 4.1. International Actuarial Association (IAA)
 - 4.2. Actuarial association of Europe/ Group Consultatif (AAE)
 - 4.3. Macedonian Actuarial Association (MAZ)
 - 4.4. The Statute of the Associations
 - 4.5. Code of Conduct of the actuarial profession
 - 4.6. Guidelines for Disciplinary Proceedings
 - 4.7. Continuing professional development (CPD)
 - 4.8. Standards of practice
5. Regulatory framework for actuaries in Macedonia
 - 5.1. Law on supervision on insurance
 - 5.2. Law on mandatory fully funded pension insurance
 - 5.3. Law on voluntary fully funded pension insurance
 - 5.4. Law on payment of pension and pension benefits from fully funded pension insurance
 - 5.5. Licensed, authorized and appointed actuary
 - 5.6. Rulebook on the actuarial profession
 - 5.7. Other regulation that affect the work of actuaries
6. Professional role of actuaries
 - 6.1. Analysis and resolution of ethnical challenges
 - 6.2. Identifying and managing conflicts, abuse of advices and improper influence of advice
 - 6.3. The nature of advices
 - 6.4. Public interest
7. Problems that actuaries face in practice – analysis of examples

Literature:

1. Macedonian actuarial association (www.aktuar.mk)
2. International actuarial association (www.actuaries.org)
3. Actuarial association of Europe (www.actuary.eu)
4. European actuarial academy (www.actuarial-academy.com)