



2017 ASTIN AFIR/ERM COLLOQUIA PANAMA CITY, PANAMA

APPLIED ACTUARIAL WORKSHOPS

This year's Colloquia will premiere a new feature: intensive actuarial workshops with a focus on applications, to complement the Colloquia's over-arching theme of "actuarial engineering," by bridging gaps between theory and practice. Internationally renowned scholars and practitioners will impart half-day educational workshops from August 21-24th for students, scholars and practitioners to delve into and discuss fundamental modelling and management elements of any actuarial, risk-management and financial professional's tool-box.

Content:

1. Basic Reserving Methods, on August 21st, instructor Roger Hayne

With a focus on Non-Life reserving methodologies, the workshop will explain the basic methodologies for constructing and analyzing an insurer's liabilities.

2. Enterprise Risk Management, on August 21st, instructor Stéphan Loisel

The workshop will cover risk concepts and frameworks for measurement and management of risk, with concrete case studies to illustrate.

3. Pricing, on August 22nd, instructor Chris Cooksey and Axel Wolfstein. The workshop explains the basics of establishing rates for most lines of business, and covers fundamentals of data, model design and rate adequacy.

4. Derivatives, on August 22nd, instructor Olivier Le Courtois

An intensive overview of derivative pricing methods with a focus on the use of transforms such as the Fourier transform to model these kinds of instruments.

5. Reinsurance, on August 23rd, instructors Eberhard Müller and Eric Dal Moro

Building up to the pricing model of a reinsurer, the workshop will introduce reinsurance contract structures and cover extreme events pricing and coverage.

6. Bayesian Markov Chain Monte Carlo Modelling, on August 23rd, instructor Glenn Myers

Coverage of stochastic modelling with applications and demonstrations using common statistical programming languages.

7. Bonus-Malus Rating Systems, on August 24th, instructor Jean Lemaire

The uses and methods of "bonus-malus" or merit-based ratemaking systems, with special applications for insurers pricing based on claims history.

8. Modelling and Management of Longevity Risk, on August 24th, instructor Andrew Cairns

An introduction to the modelling tools and managerial aspects of companies' exposures to longevity risk.

9. Term Structure Models, on August 24th, instructor Michael Sherris

An overview of the most widely used interest rate or term structure models, for actuarial and financial applications.

10. Solvency Models, on August 24th, instructor Frank Cuyppers

Implementation of methodologies for modelling an insurer's solvency, to be used in capital allocation, reinsurance optimization and portfolio planning.

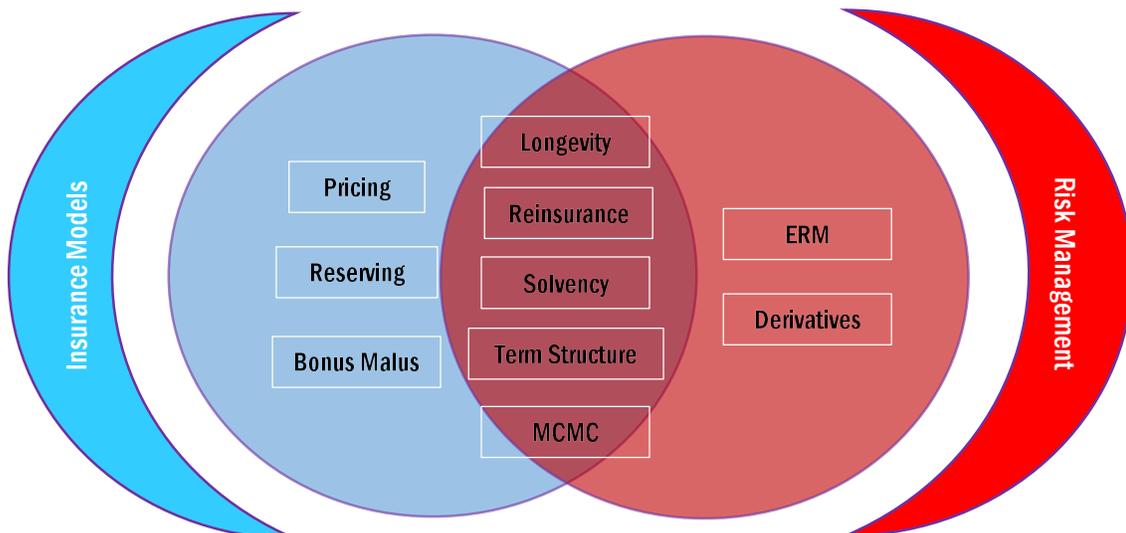
A more in depth description of each workshop can be found in the pages that follow.

WORKSHOP CALENDAR*

Monday (Aug. 21)	Tuesday (Aug. 22)		Wednesday (Aug. 23)	Thursday (Aug. 24)	
Plenary Session: <i>Paul Embrechts</i>	Plenary Session: <i>Dave Ingram</i>		Plenary Session: <i>Supervisor Panel</i>		
Reserving	Pricing	Deriva- tives	Reinsurance	Bonus Malus	Term Structures
Enterprise Risk Management (ERM)			MCMC	Solvency	Longevity
Plenary Session: <i>Clemente Cabello</i>					

*See Colloquium website for the full event program, including social program.

Modelling Tools for Insurance, Finance and Risk Management:



ENTERPRISE RISK MANAGEMENT

Name of Workshop: Enterprise Risk Management

Instructor(s): Stéphane Loisel

Date: August 21, 2017

Time: 09:30 – 13:00

Room: Gran Salon

Workshop Description:

This workshop will provide an overview of Enterprise Risk Management in insurance. Key topics covered will be:

- ERM Concept and Framework
- Risk appetite
- Risk identification and taxonomy
- Risk measurement (risk maps, scenarios, risk measures including VaR and TVaR)
- Risk aggregation
- Risk register and risk controls
- Economic capital models and economic capital allocation

Case studies will help participants to see how to apply those concepts in real world.

BASIC RESERVING METHODS

Name of Workshop: Basic Reserving Methods

Instructor(s): Roger Hayne

Date: August 21, 2017

Time: 14:30 – 18:00

Room: Gran Salon

Workshop Description:

The workshop will present some basic methods used in analysis of non-life insurance liabilities, sometimes called reserves. We will assume little to no prior knowledge of the non-life reserving process or methodology.

We will begin with a discussion of the life cycle of a non-life claim and then data usually used to evaluate non-life reserves. This includes the assembly of the usual development “triangle” data arrangement that forms the basis for most of the common basic non-life reserving methods.

The common non-life reserving methods we will consider include

- Chain Ladder Method
- Expected Loss Ratio Method
- Bornhuetter-Ferguson Method

Not only will we describe the methods but we will also review their underlying assumptions as well as conditions that could influence the accuracy of individual methods.

We hope to conclude with the opportunity of attendees to put the tools covered into practice with a few scenarios with a hands-on exercise. We intend to break up the attendees into four groups and assign each one of four sets of data to analyze. Each data set will have a different event affecting the data. The teams will be able to review the data, prepare reserve estimates, and then present those results to “management” (the workshop attendees).

Because of the hands-on portion of this workshop attendees are encouraged to bring a laptop (or tablet) capable of running Microsoft’s Excel. Workbooks with the different scenarios will be available prior to the workshop. Since we will break into groups only one computer per group would be required.

PRICING

Name of Workshop: Pricing

Instructor(s): Axel Wolfstein and Chris Cooksey

Date: August 22, 2017

Time: 09:30 – 13:00

Room: Contadora 2

Workshop Description:

The Pricing Workshop covers the basics of setting rates for the majority of lines of business. Through the course of the session, the topics will include the fundamentals of data, the basics of adequate pricing, and the issues around proper segmentation while leaving out the underlying mathematical details.

Topics will include:

Data

- Exposure definitions
- Time periods
- Metrics

Rate Adequacy

- Basic Premium/Tariff Equation
- Current leveling
- Development
- Trending

Model Design

- Adverse selection
- Binning fields/classification
- Selecting fields
- Dependencies/correlations
- Generalized Linear Models
- Model Selection

Case Study

The goal is to enable the participants to synthesize the many different components that are part of a coherent rating plan.

DERIVATIVES

Name of Workshop: Derivatives
Instructor(s): Olivier Le Courtois
Date: August 22, 2017
Time: 09:30 – 13:00
Room: Gran Salon

Workshop Description:

The workshop shows how function transforms can be applied to the pricing of derivatives. These methods provide a modern and efficient alternative to classic PDE and Monte Carlo approaches. They allow their users to deal with a variety of products and models. The workshop covers the following topics:

- A special focus is made on (inverse) Laplace and Fourier transforms.
- We show how these tools can be used to manage a variety of modeling situations, such as frameworks with jumps, stochastic time changes or regime-switching.
- Another focus is made on Wiener-Hopf factorization, which deals with the infimum and supremum of stochastic processes and therefore helps pricing a broad class of derivatives.
- Illustrations cover derivatives embedded in life insurance contracts, such as guarantees associated with variable annuities.

The pedagogical approach retained will alternate theoretical developments and applications. Participants will reach a broad understanding of the topics covered and will enlarge their toolbox with methods that can be useful for a broad area of applications.

REINSURANCE

Name of Workshop: Reinsurance

Instructor(s): Eric Dal Moro and Eberhard Müller

Date: August 23, 2017

Time: 09:30 – 13:00

Room: Gran Salon

Workshop Description:

The workshop will start with an overview of the reinsurance markets both on the life and non-life sides. From there, it will describe the main reinsurance contract structures (Quota-shares, Non-proportional with/without Annual Aggregate Deductible/Limits) to cover the different risks of a primary insurer. After this introduction, a focus on natural catastrophe reinsurance will cover historical events (earthquakes, floods, hurricanes, etc.) and their costs to the reinsurance market. It will also describe the way in which such extreme events are covered and priced by reinsurers.

Finally, a real life example of a non-proportional standard cover will show the models used by reinsurers to price these contract structures. This example will be based on the pricing tool of a reinsurer.

BAYESIAN MARKOV CHAIN MONTE CARLO MODELS

Name of Workshop: Bayesian Markov Chain Monte Carlo Models

Instructor(s): Glenn Meyers

Date: August 23, 2017

Time: 14:30 – 19:00

Room: Gran Salon

Workshop Description:

Bayesian stochastic models have long suffered from the problem that the available models were usually too simple to use for many actuarial applications. More recently, Bayesian Markov Chain Monte Carlo (MCMC) models have enabled us to take large samples from the posterior distribution of the models that are used in actuarial science. A Bayesian MCMC model is a Markov chain that is defined in terms of the prior and conditional distributions. After running the chain for a while, the chain converges to the posterior distribution implied by the model.

After a general description of Bayesian MCMC models, the workshop will give live examples that show Bayesian MCMC in action. The examples will illustrate:

1. How to tell when the model has converged.
2. How to use information criteria to choose between alternative models.
3. How to code the models using the Stan programming language. See mc-stan.org

The actuarial applications will be fitting loss distributions and stochastic loss reserving. The flexibility of Bayesian MCMC models allow one to develop stochastic loss reserve models that reflect concerns that are not addressed in many standard actuarial models such as (1) correlations between accident years; and (2) changes in the claim settlement rate. The examples will use the R programming language with the “rstan” package. The scripts for the examples will be made available to workshop attendees.

BONUS-MALUS RATING SYSTEMS

Name of Workshop: Bonus-Malus Rating Systems

Instructor(s): Jean Lemaire

Date: August 24, 2017

Time: 08:30 – 13:00

Room: Contadora 2

Workshop Description:

Bonus-malus systems (BMS - also called merit-rating systems) are widely used in motor insurance to modify a policyholder's premium according to his claims history. This workshop will present tools that have been proposed in the actuarial literature to compare existing BMS and design new systems. Probability distributions such as the Poisson and the negative binomial, commonly used in motor insurance, will be presented and used to fit a real-life motor insurance portfolio.

Several BMS systems used in practice will be presented. These systems can be analyzed using Markov Chains theory. Classical tools of this theory (transition matrix, k-step transition probabilities, stationary distribution) will be shown to be useful to forecast the distribution of policyholders subject to a BMS. They will lead to the design of several tools that can be used to analyze BMS:

- stationary average level,
- variability of premiums,
- elasticity of premiums with respect to the claim frequency,
- optimal bonus hunger strategy.

The presentation will be in English, with slides in English or Spanish depending on the audience. The workshop will be largely based on a previous paper by the instructor, which will be available for download in English and in Spanish.

MODELLING AND MANAGEMENT OF LONGEVITY RISK

Name of Workshop: Modelling and Management of Longevity Risk

Instructor(s): Andrew Cairns

Date: August 24, 2017

Time: 14:30 – 19:00

Room: Taboga 2

Workshop Description:

Longevity risk is the risk that a portfolio of lives live longer in aggregate than anticipated. For pension plans and annuity providers, longevity risk translates into financial losses. As a result measurement of longevity risk has become an important component of a wider package of enterprise risk management.

This workshop will provide an introduction to the stochastic models that can be used to assess a company's exposure to longevity risk. Key topics to be covered will be:

- Data and graphical diagnostics
- Systematic versus idiosyncratic mortality risk
- Modelling versus management
- Selection criteria for stochastic mortality models
- The Lee-Carter and CBD models
- Graphical diagnostics for model outputs
- Robustness
- Simulation of future mortality rates
- Uncertainty in future demographic and financial variables

The aims of the workshop are to provide participants with useful models for actuarial applications and an understanding of the issues for model implementation in practice.

TERM STRUCTURE MODELS

Name of Workshop: Term Structure Models

Instructor(s): Michael Sherris

Date: August 24, 2017

Time: 08:30 – 13:00

Room: Taboga 2

Workshop Description:

The workshop will provide an overview of commonly used term structure models, both continuous time and discrete time as well as methods used to fit models. It will provide participants with an understanding of how these models are used in financial and actuarial applications. Key topics covered will be:

- Concepts of no-arbitrage and risk neutral versus real world probabilities
- Main continuous time models, single factor models
- Discrete time models and binomial implementation including forward induction
- HJM (Heath, Jarrow, Morton), BGM (Brace, Gatarek, Musiela), LMM (Libor Market Models), and SABR (stochastic alpha, beta, rho) models
- Yield curve dynamics, affine models and dynamic Nelson-Siegel models
- Actuarial applications and issues

The aims of the workshop are to provide participants with useful models for actuarial applications and an understanding of the issues for model implementation in practice.

For more information www.actuaries.org/panama2017

Date: 21 – 24 August, 2017

Time: 8:30 – 19:00

Place: Grand Sheraton Hotel, Panama City, Panama

Includes: Colloquium registration, coffee breaks (AM and PM), lunch

Fees: start at USD 200.00, check Colloquim website: www.actuaries.org/panama2017/fees.html and register online

SOLVENCY MODELS

Name of Workshop: Solvency Models
Instructor(s): Frank Cuypers
Date: August 24, 2017
Time: 14:30 – 19:00
Room: Colon

Workshop Description:

The workshop provides an overview of the standard frameworks of Solvency II, together with comparisons and excursions into the Swiss Solvency Test and the marvelous world of internal models. It addresses the underlying theory and concepts as well as its practical implementations with Excel® templates, and familiarizes the participants with the fundamental tools they need to implement risk, capital and solvency models:

- Components of the economic balance sheet and Risk Bearing Capital (discounted reserves, etc.)
- Components of the risk and the Solvency Capital Requirement (large & attritional losses, market risk, etc.)
- Reinsurance (proportional and non-proportional)
- Risk aggregation (Monte Carlo algorithmic, dependencies and copulas)
- Meta-risks (parameter risk, deterministic stress scenarios, etc.)

The goal is to enable the participants to put this acquired know-how into practice on the spot with applications such as:

- Portfolio planning
- Reinsurance optimization
- Capital allocation

We shall simultaneously present on two separate screens the theoretical foundations in PowerPoint® format and the matching practical applications on an Excel® platform. Thanks to the interlocking of theory and practice, the course contents are taught in a most efficient manner and the participants are challenged intensively.