Casualty & Health Insurance Mathematics
ACTSC 625, Winter 2015

Instructor:	Ruodu Wang, M3 3122, ext. 31569, wang@uwaterloo.ca
Lectures:	12:00 – 1:50 Mondays and Wednesdays, M3 2101.
Office hours:	4:30 – 5:30 Mondays and Wednesdays, or by appointment.
	You are welcome to drop by my office at any time,
	and if I am not occupied I will be happy to answer your questions.

Reference

The primary source of materials is the course slides/note which will be available on the Learn. The main reference is *Loss Models*, by Klugman, Panjer and Willmot (Wiley, fourth edition).

Homework

I plan to set four individual assignments. The assignments will be equally weighted. All assignments will contribute to your coursework grade. Assignments should be handed in to the instructor by the end of the class on the due day. Late assignments are not acceptable.

Midterm

One midterm is scheduled at the lecture time tentatively on Wednesday, Feb 25.

Course Evaluation Breakdown

(1) Assignments 20%;

(2) Midterm 15%;

(3) Final Exam 65%.

Course Contents

Students are expected to learn

- standard features of non-life insurance and reinsurance policy design

- standard frequency and severity models for insurance losses
- the impact of deductibles and reinsurance on the models and estimation
- moments and probabilities for compound distributions, especially compound Poisson, compound binomial, and compound negative binomial
- Bayesian estimation to loss models
- Buhlmann-Straub and exact Credibility premiums
- principles of claims reserving for non-life insurance, using run-off triangle methods
- introductory ruin theory
- some additional and advanced topics.

This course has a focus on mathematical and statistical aspects.

CIA Mapping

This course is mapped to exam C/4 in CIA University Accreditation, together with ACTSC 632.

Tentative Schedule

There may be changes.

Lecture	Topic	Book chapters
Lecture 1	Introduction to P&C and health insurance	note
Lecture 2	Loss severity distributions - models and transformations	3
Lecture 3	Loss severity distributions - estimation	13
Lecture 4	Loss severity distributions - model selection	16
Lecture 5	Loss frequency distributions and processes 1	6
Lecture 6	Loss frequency distributions and processes 2	6
Lecture 7	Aggregate claims models 1	9
Lecture 8	Aggregate claims models 2	9
Lecture 9	Aggregate claims models 3	9
Lecture 10	Policy modification and reinsurance	note
Lecture 11	Basics of Bayesian statistics	15
Lecture 12	Credibility premiums 1	17-18
Week 7	(Reading week)	
Lecture 13	Midterm review	
Week 8 Wed	Midterm	
Lecture 14	Credibility premiums 2	17-18
Lecture 15	Credibility premiums 3	17-18
Lecture 16	Reserves	note
Lecture 17	Ruin theory 1	note
Lecture 18	Ruin theory 2	note
Lecture 19	Selected topics: comparison of risks	note
Lecture 20	Selected topics: insurance premium principles	note
Lecture 21	Selected topics: dependence in insurance models	note
Lecture 22	Final review	
Lecture 23	Final review	