

# **PENSION MATHEMATICS**

## **ACT 470H1**

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# PENSION MATHEMATICS (ACT 470H1)

## Course Outline

<b>Date</b>	<b>Week#</b>	<b>Description</b>
January 13	1	Intro to Pensions/Anderson ch. 1,2.1
January 20	2	Anderson ch. 2.2-2.6
January 27	3	Anderson ch. 2.7-2.11
February 3	4	Anderson ch. 3.1-3.5
February 10	5	Anderson ch. 3.6, 4.1-4.4
February 17		Reading Week
February 24	6	Mid Term Exam
March 2	7	Review of Mid Term
March 9	8	Anderson ch. 5/6
March 16	9	Anderson ch. 6/7
March 23	10	Cost Methods revisited
March 30	11	Review
April 6	12	Review

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## **Course Readings**

**Pension Mathematics for Actuaries (Third Edition), by A.W. Anderson, Chapters 1-7.**

## **Grading Outline**

<b>Assignments (2x10)</b>	<b>20%</b>
<b>Mid-term Exam</b>	<b>30%</b>
<b>Final Exam</b>	<b><u>at most 50%</u></b>
<b>Total</b>	<b><u>100%</u></b>

**There will be a third assignment/project that will be worth 10% and depending on your grade, will reduce the weight of the final exam.**

## Course overview of ACT 470 – University of Toronto

Course contents / approach: ACT 470 covers and introduces the students to the fundamental concepts of pension funding and actuarial cost methods. The course focuses in on private pension plans, pricing and valuation of liabilities and assets. Emphasis is also placed on gain loss analysis and selection of actuarial assumptions.

The course material is based on Anderson, Pension Mathematics for Actuaries and on Aitken, Pension Funding and Valuation. The course is taught over a 12 week period – problem sets, Midterm and Final exam.

The material is broken down as follows:

- Introduction to pension plans , legislation , terms and conditions and different types of plans and funding implications – defined benefit vs defined contribution
- Calculations of pension benefits and prevalence in the Canadian market – Career Average vs Final Average vs Flat dollar plans. Advantages of each benefit calculation and plan terms
- Actuarial cost method introductions and detailed development of methods from first principles. Definition of Normal Cost and Actuarial liability and application to valuation reports
- Further work on cost methods – level dollar methods , level % of pay methods – example of application of Unit Credit , Entry Age normal , Attained age normal , Aggregate Method , Frozen Initial liability method.
- Development of Gain / Loss by source and by plan as a whole. Development of each term of Gain and Loss
- Asset review , application of various asset valuation methods and gain / loss application
- Actuarial equivalent and postponed retirement
- Appropriate actuarial assumptions and development and choosing appropriate terms
- Contributory plans and further development of cost methods
- Further development of gain and loss – review of actuarial report and application of various cost methods to specific plan

The student once they complete this course, should be very familiar with all of the cost methods and able to apply and develop from first principles and work through all types of gain / loss scenarios. They should also be very familiar with a valuation report and able to articulate movements and changes given the course material