



# E-LEARNING OFFER

## Interactive catalogue

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## Table Of Contents

### 04 Insurance

- Insurance for all .....4

### 05 Data Analytics

- Data culture .....5
- Machine Learning .....6
- Digital awareness.....6

### 08 Training examples including some of these modules

- Self-learning training paths.....8
- Master classes.....8

# Our offer in E-learning modules and training paths

This document contains the list of directly available e-learning modules. It also aims at showing examples of training paths built with these modules.

Those training paths are usually designed according to our clients' needs in terms of content, audience, length, training goals... Our educational experts are ready to listen to your needs in order to offer you the tailor-made training that best suits you.

We also provide basic developments like module translation, quiz addition or development of glossaries.



# Insurance

■ Green: available  
■ Red: not (yet) available

INSURANCE FOR ALL					
MODULES	EN	FR	NL	Length	Quiz
<b>General concepts</b>					
Economic concepts of insurance and principles				18 min	
Financial Mathematics for Insurers				57 min	
Insurance contracts - definition and classification				22 min	
Introduction to financial products				26 min	
Components of an insurance premium and pricing				34 min	
Main activities of an insurance company				45 min	
<b>Non-life insurance</b>					
Focus on non-life insurance products				22 min	
Non-life premiums and premium provisions				25 min	
Claims and claims provisions				32 min	
Non-life balance sheet and profit and loss statement (P&L)				35 min	
<b>Life insurance</b>					
Focus on life insurance products				20 min	
Basics of life pricing				21 min	
Life provisions and financial statements				25 min	
<b>Health insurance</b>					
Focus on health insurance products				23 min	
Health insurance pricing and provisioning				45 min	
Workers' compensation - Law of April 10 1971				22 min	
Statutory vs. economic valuation of provisions for WC annuities				35 min	
<b>Insurance law</b>					
Responsibility under the law				30 min	
<b>Measuring and managing performance</b>					
An introduction to Solvency 2				31 min	
An introduction to IFRS17				30 min	
The main principles of asset and liability management				30 min	
Risk mitigation and reinsurance				27 min	

# Data Analytics

DATA CULTURE					
MODULES	EN	FR	NL	Length	Quiz
Introduction to data culture				20 min	
Main principles about data				45 min	
Data preparation and data quality				29 min	
Data governance within Solvency 2				28 min	
Insurance regulation about data (GDPR)				30 min	
Data analytics and statistics				41 min	
Introduction to machine learning				45 min	
Text mining				30 min	
Open data				30 min	
Web scraping				24 min	
Introduction to data visualization				40 min	
Emergence of new technologies				35 min	
New waves in insurance				39 min	
Data security				29 min	

<b>MACHINE LEARNING</b>					
<b>MODULES</b>	<b>EN</b>	<b>FR</b>	<b>NL</b>	<b>Length</b>	<b>Quiz</b>
Supervised machine learning (part 1)	■	■	■	50 min	■
Supervised machine learning (part 2)	■	■	■	50 min	■
Unsupervised machine learning	■	■	■	50 min	■
Advanced data visualization	■	■	■	40 min	■

<b>DIGITAL AWARENESS</b>					
<b>MODULES</b>	<b>EN</b>	<b>FR</b>	<b>NL</b>	<b>Length</b>	<b>Quiz</b>
Introduction	■	■	■	30 min	■
Ideation	■	■	■	28 min	■
Lean startup	■	■	■	35 min	■
Agile methodologies	■	■	■	35 min	■
Emergence of new waves and technologies (part 1)	■	■	■	28 min	■
Emergence of new waves and technologies (part 2)	■	■	■	43 min	■



# Training examples including some of these modules

## SELF-LEARNING TRAINING PATHS

### BASICS IN LIFE (OR NON-LIFE OR HEALTH) INSURANCE

- Designed to inform about the insurance activities and to give the keys to better understand the social and economic importance of the insurance sector
- Composed of 10 e-learning modules (between 30 and 45 minutes each)
- The targeted audience is very large, anyone with interest for the topics should be able to follow the path
- The underlying idea is also to allow employees of an insurance company to better understand their own activity in a global context

### DATA CULTURE (BASICS)

- Designed to create awareness among a very large audience
- Composed of 14 e-learning modules (between 30 and 45 minutes each) separated in 3 chapters (Foundation of data culture, Data analytics practices, New technologies)
- Cases and examples are currently from the insurance business, but will be soon adapted for banks and other financial institutions.

## MASTER CLASSES (GUIDED BLENDED TRAININGS)

### NON-LIFE PRICING AND PROFITABILITY ANALYSIS

- The aim of this training is to
  - Present basic and more advanced actuarial/statistical techniques used in non-life pricing, competition analysis and profitability analysis.
  - Focus on some practical problems faced by pricing actuaries and product managers by presenting practical examples and running case studies with the participants.
  - Introduce machine learning techniques used in non-life pricing in order to open new perspectives for product development (competition analysis, profitability analysis,...).
- Composed of e-learning modules, webinars and case studies, for a total of 21 hours of training.
- Case studies in R and Excel

### PERFORMANCE OF AN INSURANCE COMPANY

- The aim of this training is to
  - Present the functioning of an insurance company and the insurance and financial products it manages
  - Explain how to read and understand the different elements of an insurance balance sheet and P&L
  - Compute performance indicators used in different regulatory frameworks
  - Understand the impact of pricing & portfolio management, risk mitigation (reinsurance) and ALM on the performance
- Composed of 14 e-learning modules, 6 webinars and case studies, for a total of 15 hours of training.
- Case studies in Excel

## DATA CULTURE (ADVANCED)

- Advanced Data culture program available in 3 tracks (depending on the targeted audience):
  - Technical track: combination of class-room, e-learning modules and notebooks (up to 8 days of training)
  - Business track: mainly class-room (5 days)
  - Executive track: 4-5 sessions of 2h lunches
- The aims of this training is to:
  - develop the knowledge on data topics
  - present practical applications of data science in financial organizations
  - solve practical business cases

**INSURANCE FOR ALL**



# GENERAL CONCEPTS

<b>General 1</b>	<b>Economic concepts of insurance and principles</b>
<b>Length of the module</b>	18 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Introduction to the economic concept of insurance responding to the uncertainty that has always been present in the history of humanity</li> <li>✓ Presentation of the concepts of mutualization and diversification</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Uncertainly and insurance</li> <li>2. A bit of physics</li> <li>3. From physics to mutualization</li> <li>4. A bit of anthropology</li> <li>5. A bit of economics</li> <li>6. Back to our insurer function</li> <li>7. The roles of insurance</li> <li>8. Insurer's risks</li> <li>9. Mutualization, diversification, time</li> <li>10. Conclusion</li> </ol>
<b>Prerequisite</b>	



<b>General 2</b>	<b>Financial Mathematics for Insurers</b>
<b>Length of the module</b>	57 minutes
<b>Context and learning objectives</b>	<p>✓ Insurers, and actuaries in particular, use financial mathematics concepts that are essential for understanding the mechanics of balance sheet valuations, for example. This module aims to explain the basics of financial mathematics to beginners, using examples from the insurance industry.</p>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Representation of financial flows</li> <li>3. Interest Rate</li> <li>4. Interest rate curve</li> <li>5. Types of interest curve</li> <li>6. Net present value</li> <li>7. Internal rate of return</li> <li>8. Duration and ALM introduction</li> <li>9. Conclusion</li> </ol>
<b>Prerequisite</b>	



<b>General 3</b>	<b>Insurance contracts - definition and classification</b>
<b>Length of the module</b>	22 minutes
<b>Context and learning objectives</b>	✓ Presentation of the notion of an insurance contract and its various classifications according to different criteria
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Technical classification</li> <li>3. Non-life insurance contracts</li> <li>4. Example</li> <li>5. Life insurance contracts</li> <li>6. Legal classification</li> <li>7. Classification according to the mandatory nature of the insurance</li> <li>8. Two mandatory insurances</li> <li>9. The market</li> <li>10. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1



General 4	Introduction to financial products
<b>Length of module</b>	26 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Describe and explain the functioning of the most common assets: bonds and shares</li> <li>✓ Introduce the derivatives: another type of financial asset</li> <li>✓ Visualize the position of financial assets on the balance sheet of an insurance company</li> <li>✓ Identify the main risks linked to these financial products</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. The position of financial assets in a balance sheet</li> <li>3. Bonds</li> <li>4. Bond issuers</li> <li>5. Financial concepts</li> <li>6. Shares</li> <li>7. Share indexes</li> <li>8. Market risk for bonds</li> <li>9. Derivative products</li> <li>10. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2



<b>General 5</b>	<b>Components of an insurance premium and pricing</b>
<b>Length of the module</b>	34 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Explain the composition of an insurance premium and how it is calculated</li> <li>✓ Remind the two fundamental principles of insurance companies: the inversion of the production cycle and the concept of mutualization of risks</li> <li>✓ Introduce some basic concepts of statistics and probabilities</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Inversion of the production cycle</li> <li>3. The calculation of the risk premium</li> <li>4. The concept of average</li> <li>5. The principle of mutualization</li> <li>6. A simple example</li> <li>7. Life products vs non-life products</li> <li>8. The components of an insurance premium</li> <li>9. Loss ratio: numerical example</li> <li>10. The commercial premium</li> <li>11. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3



<b>General 6</b>	<b>Main activities of an insurance company</b>
Length of the module	45 minutes
Context and learning objectives	This module introduces the main activities specific to insurance companies, with particular emphasis on the development and distribution of insurance products as well as the management of existing contracts.
Table of content	<ol style="list-style-type: none"> <li>1. Product Design &amp; Pricing</li> <li>2. Distribution</li> <li>3. Underwriting &amp; Risk Selection</li> <li>4. Contract &amp; Portfolio Management</li> <li>5. Investment</li> <li>6. Claims Management</li> <li>7. Risk Management &amp; Reinsurance</li> <li>8. Finance &amp; Reporting</li> </ol>
Prerequisite	/





# NON-LIFE INSURANCE

<b>Non-life 1</b>	<b>Focus on non-life insurance products</b>
<b>Length of the module</b>	22 minutes
<b>Context and learning objectives</b>	✓ Description of the main Non-life products through the story of a life
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Workers' compensation (WC) insurance</li> <li>3. Tenancy liability insurance</li> <li>4. Personal liability insurance</li> <li>5. Personal liability insurance – Article 1733 of the Civil Code</li> <li>6. Motor TPL insurance</li> <li>7. Omnium insurance</li> <li>8. The concept of degressivity</li> <li>9. The concept of the bonus/malus scale</li> <li>10. Objective liability</li> <li>11. Outstanding balance, multirisk and theft insurances</li> <li>12. Personal liability insurance/Family liability insurance</li> <li>13. Legal protection insurance</li> <li>14. Operation and professional liability insurance</li> <li>15. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4



Non-life 2	Non-life premiums and premium provisions
<b>Length of the module</b>	25 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Explain the premium flow within an insurance company</li> <li>✓ Explain the technical provisions linked to the premium</li> <li>✓ Link between the premium booking and the accounting year</li> <li>✓ Define the written premium and the earned premium</li> <li>✓ Present the unearned premium reserve, gross or net of commissions</li> <li>✓ Present the unexpired risk reserve</li> <li>✓ Understand the main components of an earned premium</li> <li>✓ Understand the idea of retrospective premium adjustment from one year to another</li> <li>✓ Measure the impact of the chosen definition of the earned premium on its value</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Aim of the module</li> <li>2. The life cycle of an insurance contract</li> <li>3. Written premiums vs earned premiums</li> <li>4. Calculation of the Unearned Premium Reserve (UPR)</li> <li>5. Earned premium and UPR, gross or net of commissions</li> <li>6. The earned commission</li> <li>7. Earned premium not yet written and written premium not yet earned</li> <li>8. The unexpired risk reserve</li> <li>9. The concept of unexpired risk reserve</li> <li>10. Calculation of the unexpired risk reserve – Example</li> <li>11. Conclusion</li> </ol>
<b>Prerequisite</b>	Non-life 1



<b>Non-life 3</b>	<b>Claims and claims provisions</b>
<b>Length of the module</b>	32 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Explain the booking methods for claims within an insurance company</li> <li>✓ Explain the various types of technical provisions associated with these claims</li> <li>✓ Understand the main components of the claims costs</li> <li>✓ Use certain valuation methods for technical provisions</li> <li>✓ Define a first profitability ratio, the loss ratio</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Speed of claims settlement</li> <li>3. Outstanding claims reserve</li> <li>4. Fixed amount reserve (small claims)</li> <li>5. Fixed amount reserve, management</li> <li>6. Fixed amount reserve (large claims)</li> <li>7. General provisions</li> <li>8. Provision for IBNER and for IBNR</li> <li>9. Provisions for expected recoveries</li> <li>10. Provision for internal loss adjustment</li> <li>11. Provision for equalization and catastrophe</li> <li>12. Summary</li> <li>13. Example</li> <li>14. Conclusion</li> </ol>
<b>Prerequisite</b>	Non-life 1 – 2



<b>Non-life 4</b>	<b>Non-life balance sheet and profit and loss statement (P&amp;L)</b>
<b>Length of the module</b>	35 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Explain the annual statements of an insurance company</li> <li>✓ Explain some key profitability indicators</li> <li>✓ Understand the main components of the annual statements</li> <li>✓ Understand the link between the balance sheet and the profit and loss statement by way of a simplified non-life example</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Accounting year and annual statements</li> <li>3. The balance sheet</li> <li>4. The profit and loss statement</li> <li>5. The components of the non-life profit and loss statement</li> <li>6. Example – Establishment of a non-life company</li> <li>7. Example – Year 1</li> <li>8. Example – Year 2</li> <li>9. Conclusion</li> </ol>
<b>Prerequisite</b>	Non-life 1 – 2 – 3





# LIFE INSURANCE

<b>Life 1</b>	<b>Focus on life insurance products</b>
<b>Length of the module</b>	20 minutes
<b>Context and learning objectives</b>	✓ Description of the main life products through the story of a life
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Group insurance</li> <li>3. Pension savings 1/2</li> <li>4. Pension savings 2/2</li> <li>5. Outstanding balance insurance</li> <li>6. Funeral insurance</li> <li>7. Whole-life insurance 1/2</li> <li>8. Whole-life insurance 2/2</li> <li>9. Branch 23 investment</li> <li>10. Medium-term savings</li> <li>11. Free supplementary pension for the self-employed (FSPSE)</li> <li>12. Pensions</li> <li>13. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4



Life 2	Basics of life pricing
<b>Length of the module</b>	21 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Identify the constituting elements of the premium</li> <li>✓ Explain the main differences between non-life and life insurance in terms of premium calculation</li> <li>✓ Go deeper into the calculation of the pure premium in life insurance</li> <li>✓ Explain the core element of life pricing: the life table (or mortality table)</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. The pure premium</li> <li>3. Life insurance contract</li> <li>4. Non-life vs life products</li> <li>5. Pricing long-term contracts</li> <li>6. The pure endowment</li> <li>7. A portfolio level</li> <li>8. Generalization</li> <li>9. Life tables</li> <li>10. Survival probabilities</li> <li>11. Types of life tables</li> <li>12. Practically</li> <li>13. Conclusion</li> </ol>
<b>Prerequisite</b>	Life 1



Life 3	Life provisions and financial statements
<b>Length of the module</b>	25 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Remind basic mechanisms such as the inversion of the production cycle and the actuarial equivalence principle</li> <li>✓ Explain what life technical provisions are (Branche 21), what they stand for and how they are calculated</li> <li>✓ Analyze the evolution of the technical provisions through time (for two specific examples)</li> <li>✓ Understand the policyholder actions that may impact the technical provisions (lapses, surrenders and policy loans)</li> <li>✓ Understand how the technical provisions fit into balance sheet and profit and loss statement (P&amp;L) through time</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Aim of the module</li> <li>2. Actuarial equivalence principle</li> <li>3. Inversion of the production cycle</li> <li>4. Balance sheet of a life insurance company</li> <li>5. Reserves calculation <ul style="list-style-type: none"> <li>• Pure endowment</li> <li>• Term insurance</li> </ul> </li> <li>6. Profit sharing</li> <li>7. Universal life products</li> <li>8. BGAAP and Solvency 2</li> <li>9. Operations on the reserve <ul style="list-style-type: none"> <li>• Surrenders</li> <li>• Lapses</li> <li>• Policy loans</li> </ul> </li> <li>10. Profit &amp; loss statement</li> <li>11. Conclusion</li> </ol>
<b>Prerequisite</b>	Life 2





# HEALTH INSURANCE

<b>Health 1</b>	<b>Focus on health insurance products</b>
<b>Length of the module</b>	23 minutes
<b>Context and learning objectives</b>	✓ Description of the main health products
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Mutual insurance companies</li> <li>3. Hospitalization insurance</li> <li>4. Dental care insurance</li> <li>5. From employee to freelancer</li> <li>6. Disability insurance</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4



<b>Health 2</b>	<b>Health insurance pricing and provisioning</b>
<b>Length of the module</b>	32 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Learn about health insurance</li> <li>✓ Explain the pricing mechanisms of health covers</li> <li>✓ List the provisions involved in health insurance</li> <li>✓ Understand the concept of ageing reserves</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Types of products</li> <li>3. Further classifications</li> <li>4. Health coverage in Belgium</li> <li>5. Commercial premium components</li> <li>6. Premium segmentation</li> <li>7. Premium evolution</li> <li>8. Premium computation</li> <li>9. A simple example of pricing</li> <li>10. Claims provisions</li> <li>11. Premiums provisions : the ageing reserve</li> <li>12. Example of computing the ageing reserve</li> <li>13. Conclusion</li> </ol>
<b>Prerequisite</b>	Health 1



<b>Health 3</b>	<b>Workers' compensation (WC) - Law of April 10 1971</b>
<b>Length of the module</b>	21 minutes
<b>Context and learning objectives</b>	<p>In Belgium, the staff of private sector employers is covered against the consequences of accidents at work and accidents on the way to work by private insurance companies. On the other hand, in the majority of other countries - especially in Europe - this insurance is nationalized and therefore managed by the State.</p> <p>This type of insurance, quite specific to our country, is governed by the law of April 10, 1971.</p> <p>For public sector staff, coverage is the responsibility of the public bodies, which remain the legal debtors of compensation. This coverage is provided for by the law of July 3, 1967. This is not covered by this module.</p> <ul style="list-style-type: none"> <li>✓ Present the general principles of the 1971 law</li> <li>✓ Explain the terms of coverage</li> <li>✓ Explain how this guarantee works</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. A bit of history</li> <li>3. The specificity of the 1971 law</li> <li>4. The insurance contract</li> <li>5. Description of the accident at work</li> <li>6. Temporary incapacity vs Permanent incapacity</li> <li>7. Calculation of basic remuneration</li> <li>8. Calculation of temporary compensation</li> <li>9. Calculation of permanent compensation</li> <li>10. Help from a third party</li> <li>11. Rate of permanent disability</li> <li>12. Some figures</li> <li>13. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4





# MEASURING AND MANAGING PERFORMANCE

Solvency 2	An introduction to Solvency 2
<b>Length of the module</b>	31 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Introducing the main concepts of Solvency 2 regulation</li> <li>✓ Presentation of the 3 pillars of Solvency 2</li> <li>✓ Focus on the quantitative pillar 1</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Inversion of production cycle</li> <li>3. From Solvency I to Solvency 2</li> <li>4. The 3 pillars of Solvency 2</li> <li>5. Pillar 1 - Economic balance sheet</li> <li>6. Pillar 1 - Technical provisions</li> <li>7. Pillar 1 - Assets</li> <li>8. Pillar 1 - SCR, MCR, Own funds</li> <li>9. Pillar 1 - SCR computation</li> <li>10. Pillar 2 - Governance</li> <li>11. Pillar 2 - ORSA</li> <li>12. Pillar 3 - Disclosure</li> <li>13. Conclusion</li> </ol>
<b>Prerequisite</b>	



<b>IFRS17</b>	<b>An introduction to IFRS 17</b>
<b>Length of the module</b>	30 minutes
<b>Context and learning objectives</b>	<p>From January 2023, IFRS 17 will apply to insurance and reinsurance contracts.</p> <ul style="list-style-type: none"> <li>✓ Understand the main concepts of IFRS 17</li> <li>✓ Learn about the main differences with Solvency 2</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Solvency 2 vs IFRS 17</li> <li>3. Different types of provisions</li> <li>4. Granularity</li> <li>5. Valuation methods</li> <li>6. Default method (the BBA)</li> <li>7. Other methods</li> <li>8. Statement of comprehensive income</li> <li>9. The P&amp;L</li> <li>10. The OCI (Other Comprehensive Income) option</li> <li>11. Reporting and disclosure</li> <li>12. Conclusion</li> </ol>
<b>Prerequisite</b>	Solvency 2



<b>ALM</b>	<b>The main principles of asset and liability management</b>
<b>Length of the module</b>	30 minutes
<b>Context and learning objectives</b>	<ul style="list-style-type: none"> <li>✓ Understanding within an insurance company, the main principles of asset and liability management, commonly known as ALM</li> <li>✓ Explaining the objectives of asset and liability management and how it can allow the profitability of an insurance company to grow</li> <li>✓ Presenting the various risks that an insurer must bear and that an effective asset and liability management will attempt to measure and limit</li> <li>✓ Understanding why coordinated management of the decisions relevant for the liabilities and assets is absolutely necessary in an insurance company</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Aim of the module</li> <li>2. Introduction</li> <li>3. The asset and liability management of an insurance company</li> <li>4. The aims of asset and liability management</li> <li>5. Examples</li> <li>6. The aims of asset and liability management</li> <li>7. Premiums collection and reserving</li> <li>8. An example from life insurance</li> <li>9. Investment of premiums</li> <li>10. Immunization with duration</li> <li>11. Solvency of the insurer and risk management</li> <li>12. Asset and liability management and liability risks</li> <li>13. Underwriting risk</li> <li>14. Lapse risk in life insurance</li> <li>15. Default risk</li> <li>16. Market risk</li> <li>17. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4



Reinsurance	Risk mitigation and reinsurance
<b>Length of the module</b>	27 minutes
<b>Context and learning objectives</b>	<p>Reinsurance is insurance for the insurance company. Reinsurance companies offer their services to insurance companies, which may transfer part of their risks to their reinsurers.</p> <p>As reinsurance is a relatively complex field, we do not pretend to be exhaustive, but aim at giving you a flavor of its crucial role.</p> <ul style="list-style-type: none"> <li>✓ Definition of reinsurance</li> <li>✓ Give the reasons for reinsurance and present its various forms.</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Formal definition of reinsurance</li> <li>3. Why reinsurance?</li> <li>4. Retrocession and diversification</li> <li>5. Counterparty risk</li> <li>6. The various types of reinsurance treaty</li> <li>7. The various forms of reinsurance treaty</li> <li>8. Surplus share treaty</li> <li>9. Non-proportional reinsurance – excess of loss</li> <li>10. Conclusion</li> </ol>
<b>Prerequisite</b>	General 1 – 2 – 3 – 4



**DATA ANALYTICS**



# DATA CULTURE

<b>DATA CULTURE 1.0</b>	<b>Introduction to data culture</b>
<b>Length of the module</b>	20 minutes – Beginner level
<b>Context and learning objectives</b>	<p>This module introduces the functioning of an insurance company which goal is to transform a situation of uncertainty into a situation of near certainty. It helps to understand why mutualization and diversification are key to its functioning and which risks are created by the insurance business. We also introduce the importance of data all along the insurance value chain.</p> <ul style="list-style-type: none"> <li>✓ Explain the inversion of production cycle of an insurance companies</li> <li>✓ Present the 3 main principles of functioning of an insurance company: mutualization, diversification and time value of money</li> <li>✓ Provide examples of use of data all along the insurance value chain</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Functioning of an insurance company <ul style="list-style-type: none"> <li>• Inversion of production cycle</li> <li>• 3 natural protections: mutualization, diversification and time value of money</li> <li>• Evolution of the world</li> </ul> </li> <li>2. Insurance value chain <ul style="list-style-type: none"> <li>• Data all along the value chain</li> <li>• Examples of use</li> </ul> </li> <li>3. Structure of the training <ul style="list-style-type: none"> <li>• Data culture</li> <li>• Data practices</li> <li>• Innovation</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 1.1</b>	<b>Main principles about data</b>
<b>Length of the module</b>	45 minutes – Beginner level
<b>Context and learning objectives</b>	<p>This module briefly presents what is data science and its origins. Then it describes different applications within industries focusing on the insurance sector. It also introduces the current dynamic ecosystem of data science communities focusing on actors but also on tools, typical events and careers. Finally, some limits and risks are highlighted.</p> <ul style="list-style-type: none"> <li>✓ Paint the scene of the current data science ecosystem</li> <li>✓ Understand origins and why data science is such a crucial topic today in insurance</li> <li>✓ Have a global overview on main elements of the ecosystem and understand interactions</li> <li>✓ Keep limits in mind</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. What is data science? <ul style="list-style-type: none"> <li>• Main principles</li> <li>• Origin of data science</li> <li>• Main methodologies</li> </ul> </li> <li>2. Awareness of different industries <ul style="list-style-type: none"> <li>• From a global point of view</li> <li>• Zoom on financial sector</li> <li>• Main application and interest in Insurance</li> </ul> </li> <li>3. A large connected ecosystem <ul style="list-style-type: none"> <li>• Community animated by different actors: fintech, startup, professional community, etc.</li> <li>• Evolving thanks to a large range of tool</li> <li>• Praised through many networks: blog, hackathon, meetup, professional colloquium</li> <li>• Motivating and challenging career perspectives</li> </ul> </li> <li>4. Behind the scene: limits to keep in mind <ul style="list-style-type: none"> <li>• Ethic: use of personal or sensitive data</li> <li>• Legal</li> <li>• Security</li> <li>• Market perspectives</li> <li>• Return on investment and costs</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 1.2</b>	<b>Data preparation and data quality</b>
<b>Length of module</b>	29 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we explain how data is created, gathered and manipulated to be optimally used in companies. We also propose different best practices to address as efficiently as possible preparation of data with a view to creating data science projects.</p> <ul style="list-style-type: none"> <li>✓ Examine all sources of data, its structuration and its different shapes</li> <li>✓ Know how data is manipulated and organized within a data driven company</li> <li>✓ Highlight some best practices about data preparation and manipulation</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Source of data <ul style="list-style-type: none"> <li>• Many sources: internal (teams, clients, provider, website) and external data (social network, open data, Internet of things (IoT), scraping)</li> <li>• Structured versus non structured data</li> <li>• Different types of data: numerical, textual, audio, image and video</li> <li>• Data creation through the value chain of an insurance company</li> </ul> </li> <li>2. Organization and management of data <ul style="list-style-type: none"> <li>• General process</li> <li>• Creation of data</li> <li>• Gathering of data</li> <li>• Transformation and controls</li> <li>• Final use</li> <li>• Re-use</li> <li>• Focus on data warehouse and data lakes</li> <li>• Data quality principles</li> </ul> </li> <li>3. Main quality checks and actions <ul style="list-style-type: none"> <li>• Missing values</li> <li>• Coherence and accuracy check and abnormal values</li> <li>• Statistics, discretization, correlation</li> <li>• Dimension reduction</li> <li>• Feature engineering</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 1.3</b>	<b>Data governance within Solvency 2</b>
<b>Length of the module</b>	28 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we introduce the main elements of the Solvency 2 framework and its impact on data management. We explain the typical process and the key roles around data governance.</p> <ul style="list-style-type: none"> <li>✓ Explain the main concepts of the Solvency 2 framework</li> <li>✓ Present the requirements introduced by Solvency 2 regarding data management, data quality and data governance</li> <li>✓ Present the process and key roles around data governance and the related documentation that should be in place</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction to the Solvency 2 framework <ul style="list-style-type: none"> <li>• 3 pillar approach</li> <li>• Economic balance sheet: mains elements</li> <li>• Solvency Capital Requirements</li> <li>• The 4 main functions in the system of governance</li> <li>• Reporting and disclosure</li> <li>• Main impact on data: data quality and data governance</li> </ul> </li> <li>2. Data governance process and key roles <ul style="list-style-type: none"> <li>• Identification of the necessary data</li> <li>• Definition of the data architecture</li> <li>• Definition of data quality standards</li> <li>• Data governance structure</li> </ul> </li> <li>3. Documentation <ul style="list-style-type: none"> <li>• Data quality policy</li> <li>• Data dictionary</li> <li>• Reporting</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 1.4</b>	<b>Insurance regulation about data (GDPR)</b>
<b>Length of the module</b>	30 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we present the General Data Protection Regulation (GDPR) that entered into force in May 2018 and its impact on the treatment of data by (insurance) companies.</p> <ul style="list-style-type: none"> <li>✓ Introduce the main principles of GDPR</li> <li>✓ Explain the obligations related to GDPR</li> <li>✓ Create awareness among the collaborators of the company on the impact of this new regulation</li> <li>✓ Present some practical applications in the context of an insurance company</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Context <ul style="list-style-type: none"> <li>• Right to privacy and right to the protection of personal data</li> <li>• Technological evolutions</li> </ul> </li> <li>2. Scope of application, definition and principles of GDPR <ul style="list-style-type: none"> <li>• Who is concerned?</li> <li>• Different forms of consent</li> </ul> </li> <li>3. Practical organization and Obligations related to GDPR <ul style="list-style-type: none"> <li>• Transparency</li> <li>• Obligations</li> <li>• Responsibility</li> <li>• Penalties</li> </ul> </li> <li>4. Additional topics <ul style="list-style-type: none"> <li>• Outsourcing data treatment</li> <li>• Data transfer to foreign countries</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 2.1</b>	<b>Data analytics and statistics</b>
<b>Length of the module</b>	41 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we present some basics elements of the analysis of quantitative data and statistics. We also see how these concepts are at the basis of the insurance business. The main goal is not to go deep into the details but be sure that the basic concepts and vocabulary are clear to the participants.</p> <ul style="list-style-type: none"> <li>✓ Introduce the concept of mutualization and explain why it is central in insurance</li> <li>✓ Develop useful statistical concepts that are at the basis of data analytics</li> <li>✓ Present practical applications in insurance where statistical analysis is the key</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Mutualization and statistics: the basis of insurance <ul style="list-style-type: none"> <li>• The concept of mutualization in insurance: gathering risks to reduce uncertainty</li> <li>• A pragmatic introduction to the law of large numbers</li> </ul> </li> <li>2. Useful statistical concepts <ul style="list-style-type: none"> <li>• Random variables <ul style="list-style-type: none"> <li>○ General concept</li> <li>○ Examples: number of claims and claim amounts</li> </ul> </li> <li>• Elements of probability</li> <li>• Mean and variance</li> <li>• Statistical distribution <ul style="list-style-type: none"> <li>○ Discrete vs continuous distribution</li> <li>○ Some examples: Normal distribution and Poisson distribution</li> </ul> </li> </ul> </li> <li>3. Methodologies families <ul style="list-style-type: none"> <li>• Inference</li> <li>• Regression</li> </ul> </li> <li>4. Practical applications in insurance <ul style="list-style-type: none"> <li>• Premium calculation</li> <li>• Capital requirements</li> </ul> </li> <li>5. Limits <ul style="list-style-type: none"> <li>• Model error</li> <li>• Parameter error</li> </ul> </li> </ol>
<b>Prerequisite</b>	



**Length of the module**

45 minutes – Beginner level

**Context and learning objectives**

In this module, we introduce machine learning from historical aspects to theoretical and practical perspectives. We present shortly the main characteristics of this kind of statistical approach. We focus on its practical uses in insurance.

- ✓ Understand the interest of machine learning compared to a simple program
- ✓ Provide a high level presentation of different machine learning technics
- ✓ Propose a generic best practice process to address machine learning issues
- ✓ Present different machine learning application in the insurance business

**Table of content**

1. Introduction
  - Artificial Intelligence origins: introduction and historical
  - Classical program versus machine learning
  - Model is defined within 3 questions: how to represent it? How to evaluate it? How to optimize it?
2. Algorithms families
  - Supervised machine learning
  - Non Supervised machine learning
  - Other methods (partially supervised and reinforcement)
  - Comparisons
3. General process/methodologies
  - Identification of the problem
  - Data preparation and split
  - Model error and optimization
  - Visualization
  - Continuity
4. Examples of use in Insurance:
  - Supervised regression : non-life insurance pricing
  - Non-supervised regression : life insurance policies clustering
  - Supervised classification: general condition understanding
  - Non-supervised classification : broker performance study

**Prerequisite**

Data analytics and statistics



DATA CULTURE 2.3	Text mining
<b>Length of the module</b>	30 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we define text analysis. More specifically, we introduce how a text mining process could be set up and how we can apply it to the insurance context to unleash power of documents (both internal and external).</p> <ul style="list-style-type: none"> <li>✓ Understand how to manipulate raw text</li> <li>✓ Learn how to define an accurate text analysis process</li> <li>✓ Provide a few examples about insurance applications related to text mining</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Definitions <ul style="list-style-type: none"> <li>• Introduction of text mining and Natural Language Processing (NLP)</li> <li>• Interest of this type of methods</li> </ul> </li> <li>2. General process <ul style="list-style-type: none"> <li>• Global process from taxonomy to final use</li> <li>• Focus on corpus treatment and extraction</li> </ul> </li> <li>3. Advanced methodologies <ul style="list-style-type: none"> <li>• Part of speech method (POS)</li> <li>• Optical character recognition and image recognition (OCR)</li> <li>• Sentiment analysis</li> <li>• Models (unsupervised machine learning for document management) and visualization (wordcloud, ggraph, etc.)</li> <li>• Limits: language, synonyms, ironic sentences, information storage, model complexity</li> </ul> </li> <li>4. Examples of use in Insurance <ul style="list-style-type: none"> <li>• Insurance general conditions comparison</li> <li>• Claim management request classification for process optimization</li> <li>• Reinsurance treaties automated reported treatment</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 2.4</b>	<b>Open data</b>
<b>Length of the module</b>	30 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we present why open data is such a hot topic today, how it works and how insurers can take benefit from the use of open data.</p> <ul style="list-style-type: none"> <li>✓ Understand what are open data</li> <li>✓ Know how to manipulate open data</li> <li>✓ Have in mind a list of possible open data projects and applications in the insurance sector</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Open source context and motivation <ul style="list-style-type: none"> <li>• Open movement</li> <li>• Free software movement from GNU project to R, Python</li> <li>• Rise of Internet</li> <li>• Open data government initiatives</li> <li>• Pro and cons about open source</li> </ul> </li> <li>2. Open data <ul style="list-style-type: none"> <li>• General introduction : data that anyone is free to use, reuse, and/or redistribute</li> <li>• Public versus private initiatives</li> <li>• General topics: Economy, Education, Energy, Environment, Health, Justice, Science, Transport</li> <li>• Type of data</li> <li>• General characteristics</li> <li>• Focus on roles</li> <li>• Focus on use and distribution</li> </ul> </li> <li>3. References <ul style="list-style-type: none"> <li>• Belgium reference</li> <li>• European reference</li> <li>• Worldwide</li> </ul> </li> <li>4. Examples of application <ul style="list-style-type: none"> <li>• Reminder before using open data</li> <li>• Example 1: Cadaster dataset for household insurance</li> <li>• Example 2: Medicine consumption for health insurance</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 2.5</b>	<b>Web scraping</b>
<b>Length of the module</b>	24 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we present web scraping techniques used to target, extract and structure web information. We also present some limits about this practice and provide reasonable advices to exploit it without troubles. Finally, we describe insurance applications using scraping tools.</p> <ul style="list-style-type: none"> <li>✓ Present main characteristic of scraping techniques</li> <li>✓ Teach how to set up a simple process without troubles</li> <li>✓ Provide several examples of relevant applications within the insurance sector</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Concept introduction <ul style="list-style-type: none"> <li>• Definitions</li> <li>• Distinguish between crawling, scraping and parsing</li> <li>• Interest of scraping</li> <li>• Many sources: website, API, etc.</li> </ul> </li> <li>2. Main practice and process <ul style="list-style-type: none"> <li>• Define a website target or a range of websites</li> <li>• Create proxy and scraper algorithm</li> <li>• Download document, parsing and extraction</li> <li>• Drop structured info within storage</li> <li>• Data treatment and final use</li> </ul> </li> <li>3. Limits <ul style="list-style-type: none"> <li>• Website limitation (legal mentions)</li> <li>• Copyrights and jurisprudence (LinkedIn, Ryanair)</li> <li>• Security (Distributed Denial of Service (DDoS) attack)</li> <li>• Consequences: html remap, IP blocking, etc.</li> </ul> </li> <li>4. Advices</li> <li>5. Applications within the insurance sector <ul style="list-style-type: none"> <li>• House market prices for household insurance pricing</li> <li>• Car rent and motor insurance price for car leasing offers</li> <li>• Insurance trends using social network such as Twitter</li> </ul> </li> </ol>
<b>Prerequisite</b>	



DATA CULTURE 2.6	Introduction to data visualization
<b>Length of the module</b>	40 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we discuss about data visualization, as it becomes a key skill to master today. We highlight some common techniques and give use cases for the insurance sector.</p> <ul style="list-style-type: none"> <li>✓ Demonstrate why a relevant data visualization is important</li> <li>✓ Present a set of data visualization techniques</li> <li>✓ Teach good and bad practices about data visualization</li> <li>✓ Propose some insurance use cases</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Overview of data visualization <ul style="list-style-type: none"> <li>• History of data visualization: an old subject</li> <li>• Reasons for data visualization</li> <li>• Characteristics of accurate graphic representation : explore, explain a story, not distort and take into account the audience, keep it simple</li> <li>• Common issues</li> </ul> </li> <li>2. Data visualization families <ul style="list-style-type: none"> <li>• Comparison: make the difference between values or observe similarities with bar chart, multiset bar chart, pyramid, and radar</li> <li>• Composition: highlight content of data (parts of data on its total) with pie chart, marimekko chart, and treemap</li> <li>• Distribution: show frequencies and how data is spread out with box plot, density plot, and histogram</li> <li>• Relationship: illustrate connections or correlations between data with heatmap, network diagram, and bubble chart</li> </ul> </li> <li>3. Examples in Insurance <ul style="list-style-type: none"> <li>• Dashboard for insurance reporting</li> <li>• Infographic studies</li> <li>• Other examples of data visualization in Insurance</li> </ul> </li> </ol>
<b>Prerequisite</b>	



DATA CULTURE 3.1	Emergence of new technologies
<b>Length of the module</b>	35 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module we focus on three recent topics related to data management in Insurance: Internet of things (IoT), chatbot technology, and Application Programming Interfaces (API) systems.</p> <ul style="list-style-type: none"> <li>✓ Present new technologies related to data practices : IoT, chatbot technology and API systems</li> <li>✓ List pros and cons about these developments</li> <li>✓ Highlight how they can be useful for the insurance sector</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. IoT concept and application sectors <ul style="list-style-type: none"> <li>• Definition of IoT and mapping of IoT initiatives</li> <li>• New image for insurance</li> <li>• New business model / pricing for insurer</li> <li>• Prevent/ manage risks in a better way</li> <li>• Risks and limits: data breach, ransomware, DDoS attack, etc.</li> </ul> </li> <li>2. Chatbot <ul style="list-style-type: none"> <li>• What is a chatbot? Introduction with messaging app evolution, expert fields, definition and working process</li> <li>• Why a chatbot? Use of chatbot in industries, mimic human (first impression, evaluation)</li> <li>• How to create it? Presentation of Facebook, Slack, API.ai systems. Additional discussion around natural language processing</li> <li>• Some interesting applications in insurance</li> </ul> </li> <li>3. API development and functioning <ul style="list-style-type: none"> <li>• Definition of an application - programming - interface (API)</li> <li>• How does it work?</li> <li>• Types of API : local, web, program</li> <li>• Aim of an API: example with and without API for weather application.</li> <li>• Interest for users, interest for developer and business.</li> <li>• Issues related to API: monetization, application shutdown, Security</li> <li>• Example of APIs (google map, google trad, Twitter)</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 3.2</b>	<b>New waves in insurance</b>
<b>Length of the module</b>	39 minutes – Beginner level
<b>Context and learning objectives</b>	<p>In this module, we introduce the next trends about Artificial Intelligence (AI) and new technologies within the financial industry. We highlight the benefits of these new technologies for insurance, with a specific use case about smart contracts.</p> <ul style="list-style-type: none"> <li>✓ Discover the next trends in insurance</li> <li>✓ Understand market evolutions and new players</li> <li>✓ Understand the technological mechanism of blockchain (cryptocurrency)</li> <li>✓ Demystify this technology with a simple and concrete business application</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Fintech, Insurtech and Startup AI environment <ul style="list-style-type: none"> <li>• A rich ecosystem of numerous startups</li> <li>• A complex interaction with existing companies</li> <li>• Focus on Fintech and Insurtech: description, main clusters, examples of startups</li> </ul> </li> <li>2. Blockchain technology and cryptocurrency <ul style="list-style-type: none"> <li>• Definitions about blockchain technology (main definitions, public vs private, rules)</li> <li>• How does it work? (process, type of distribution)</li> <li>• Relation with cryptocurrency (bitcoin, ethereum, ripple, etc.)</li> <li>• Pro/cons and misunderstanding</li> <li>• Blockchain potential applications</li> </ul> </li> <li>3. Application with smart contract <ul style="list-style-type: none"> <li>• What is a smart contract? <ul style="list-style-type: none"> <li>○ Private space for customers</li> <li>○ Sharing platform</li> <li>○ Secure environment</li> </ul> </li> <li>• What are the key benefits? <ul style="list-style-type: none"> <li>○ Single access point in a digital portal</li> <li>○ Automatic control and automatic execution</li> <li>○ Data quality and ownership</li> <li>○ Costs</li> </ul> </li> <li>• Application to the context of insurance underwriting</li> </ul> </li> </ol>
<b>Prerequisite</b>	



<b>DATA CULTURE 3.3</b>	<b>Data security</b>
<b>Length of the module</b>	29 minutes – Beginner level
<b>Context and learning objectives</b>	<p>Today's world is ruled by technology, and we cannot do without it. From online payments to communicating with others all over the world, technology plays an important role in our lives. Nonetheless, technology can be dangerous when it is vulnerable and sensitive data is lost. Therefore, cybersecurity is one of the most important concerns for companies, especially those working with data.</p> <ul style="list-style-type: none"> <li>✓ Be introduced to cybersecurity</li> <li>✓ Learn about the threat, the attackers, their plans or motivations</li> <li>✓ Understand why and how all insurance companies must take cyber security seriously</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. What is cybersecurity? <ul style="list-style-type: none"> <li>• Definition of cybersecurity</li> <li>• Cybersecurity motivations</li> <li>• Threat origin landscape</li> <li>• Attack vectors</li> <li>• Threat actors</li> </ul> </li> <li>3. How should cyber risks be addressed? <ul style="list-style-type: none"> <li>• What is the approach?</li> <li>• Information security</li> <li>• Application security</li> </ul> </li> <li>4. Conclusion</li> </ol>
<b>Prerequisite</b>	





# MACHINE LEARNING

<b>MACHINE LEARNING</b> <b>1.1</b>	<b>Supervised machine learning (part 1)</b>
<b>Length of the module</b>	50 minutes – Intermediate level
<b>Context and learning objectives</b>	<p>In this module, we will focus on advanced machine learning techniques and see how such models work practically. We will present a first set of supervised machine learning models including decision trees, bagging, and random forest models.</p> <ul style="list-style-type: none"> <li>✓ Have a global overview on the main machine learning techniques</li> <li>✓ Be able to compare methods between each other</li> <li>✓ Understand the key calculation steps behind models</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Machine learning (ML) context <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Artificial intelligence origins and ML families</li> </ul> </li> <li>2. Error measure <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Classification problems: confusion matrix</li> <li>• Classification problems: ROC curve</li> <li>• Regression problems</li> <li>• Overfitting: training and test errors</li> <li>• Cross-validation</li> </ul> </li> <li>3. Decision tree <ul style="list-style-type: none"> <li>• Reminder</li> <li>• Optimal split</li> <li>• When to stop the splitting process - Notations</li> <li>• Pruning</li> <li>• Optimal tree</li> </ul> </li> <li>4. Bagging and random forest <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Bagging</li> <li>• Random Forests - Introduction</li> <li>• Random Forests – Variable Importance</li> </ul> </li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	Data Culture 2.2 - Introduction to machine learning



<b>MACHINE LEARNING</b> <b>1.2</b>	<b>Supervised machine learning (part 2)</b>
<b>Length of the module</b>	50 minutes – Intermediate level
<b>Context and learning objectives</b>	<p>In this module, we will focus on advanced machine learning techniques and see how such models work practically. We will present a second set of supervised machine learning models including gradient boosting, support vector machine, and neural networks models.</p> <ul style="list-style-type: none"> <li>✓ Have a global overview on the main supervised machine learning techniques</li> <li>✓ Be able to compare methods between each other</li> <li>✓ Understand the key calculation steps behind models</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Gradient boosted models             <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Boosting trees</li> <li>• Gradient descent</li> <li>• Gradient boosting algorithm</li> <li>• Features Importance</li> <li>• Illustration</li> </ul> </li> <li>3. Neural networks             <ul style="list-style-type: none"> <li>• Introduction</li> <li>• The logistic regression</li> <li>• Introduction to artificial neural networks</li> <li>• Artificial neural networks : how it works</li> <li>• Activation functions</li> <li>• Backpropagation algorithm</li> <li>• Illustration</li> </ul> </li> <li>4. Support vector machines             <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Maximal margin classifier</li> <li>• From maximal margin classifier to support vector machines</li> <li>• From maximal margin classifier to support vector machines</li> <li>• Illustration</li> </ul> </li> <li>5. Conclusion</li> <li>6. References and further reading material</li> </ol>
<b>Prerequisite</b>	Machine learning 1.1 - Supervised Machine Learning (part 1)



<b>MACHINE LEARNING</b> <b>1.3</b>	<b>Unsupervised machine learning</b>
<b>Length of the module</b>	50 minutes – Intermediate level
<b>Context and learning objectives</b>	<p>In this module, we will focus on unsupervised machine learning techniques and see how such models work practically. We will present a set of unsupervised machine learning models including hierarchical ascending classification, k-means, and dbscan.</p> <ul style="list-style-type: none"> <li>✓ Have a global overview on the main machine learning techniques</li> <li>✓ Be able to compare methods between each other</li> <li>✓ Understand the key calculation steps behind models</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction <ul style="list-style-type: none"> <li>• Introduction to unsupervised machine learning</li> <li>• Families of machine learning models</li> </ul> </li> <li>2. Partitioning clustering <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Distance measures</li> <li>• Inertia</li> <li>• K –Mean definition</li> <li>• K –Mean algorithms</li> <li>• K –Mean optimization</li> <li>• K –Mean sensitivity</li> </ul> </li> <li>3. Hierarchical clustering <ul style="list-style-type: none"> <li>• Introduction</li> <li>• General concept</li> <li>• Algorithm</li> <li>• Example</li> </ul> </li> <li>4. Density-based clustering (DBSCAN) <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Presentation of DBSCAN</li> <li>• Type of points</li> <li>• Algorithm</li> <li>• Sensitivity to parameters</li> </ul> </li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	Data Culture 2.2 - Introduction to machine learning



<b>MACHINE LEARNING 1.4</b>	<b>Advanced data visualization</b>
<b>Length of the module</b>	40 minutes – Intermediate level
<b>Context and learning objectives</b>	<p>In this module, we will study data visualization more in details. We focus on a key process to obtain an accurate data visualization, but also on new technologies and dashboarding good practices.</p> <ul style="list-style-type: none"> <li>✓ Be aware of the state of art techniques concerning data visualization</li> <li>✓ Be able to create accurate data visualization according to the context of work</li> <li>✓ Be aware of technologies and best practices about dashboarding</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Process to set up a data visualization <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Prepare the data</li> <li>• Questions to be asked and answered</li> <li>• Data visualization improvement, example</li> </ul> </li> <li>3. How statistical approaches can improve data visualization <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Regression</li> <li>• Correlation matrix</li> <li>• Clustering</li> </ul> </li> <li>4. Business case, interpretation of telematics data <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Prepare the data</li> <li>• Data visualization process</li> <li>• Improvement of the model with statistical methods</li> </ul> </li> <li>5. Best practices</li> <li>6. Conclusion</li> <li>7. References and further reading material</li> </ol>
<b>Prerequisite</b>	Data Culture 2.6 - Introduction to Data Visualization





# DIGITAL AWARENESS

Digital 1	Introduction
<b>Length of the module</b>	30 minutes – Beginner level
<b>Context and learning objectives</b>	<p>Recent evolutions in technologies, such as mobile devices and internet of things, artificial intelligence, big data and massive storage capacity, internet and network globalization, etc. make our world more and more diverse but also difficult to understand. Many elements within the insurance landscape are also evolving. The Insurance world has to address these critical evolutions, which affect natural protections but also the entire value chain of companies.</p> <ul style="list-style-type: none"> <li>✓ Refresh about the role of an insurance company with regards to its clients</li> <li>✓ Learn to adopt a relevant strategy to face the new evolutions</li> <li>✓ Understand that the digital approach (which means digitizing activities, innovating, initiating new working methodologies and using new technologies) can be a good way to drive changes and to provide preparedness, anticipation and adaptation to companies</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Functioning of an insurance company</li> <li>3. Insurance Value Chain</li> <li>4. Structure of the training</li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	



Digital 2	Ideation
<b>Length of the module</b>	28 minutes – Beginner level
<b>Context and learning objectives</b>	<p>The purpose of this module is to introduce and let you understand the importance of 2 key concepts of digital transformation: design thinking and ideation.</p> <ul style="list-style-type: none"> <li>✓ Learn about design thinking and its ability to help a company to deliver products or services with the following characteristics: robust, integrated, innovative and desirable solutions for the clients</li> <li>✓ Understand ideation, which is one of the most stimulating parts of the design thinking process: the capacity to generate ideas by using a large range of methodologies and keeping the focus on the needs of the customer</li> <li>✓ Realize how both can help develop better products capturing customers' needs</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Design thinking <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Design thinking process</li> <li>• Empathizing with customers to capture their needs</li> <li>• Focus on ideation</li> </ul> </li> <li>3. Definition of Ideation <ul style="list-style-type: none"> <li>• Sub steps of ideation</li> <li>• Why is it useful but also hard to innovate?</li> <li>• A simple exercise of creativity</li> </ul> </li> <li>4. Ideation methods and best practices <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Brainstorming</li> <li>• Mind mapping</li> </ul> </li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	Digital 1 - Introduction



<b>Digital 3</b>	<b>Lean startup</b>
<b>Length of the module</b>	35 minutes – Beginner level
<b>Context and learning objectives</b>	<p>The lean startup is a principle based approach to new product development. It provides a scientific approach to creating and managing startups and getting a desired product in the hands of the customer faster.</p> <ul style="list-style-type: none"> <li>✓ Present the main concepts linked to the lean startup, and provide some examples of how it has been implemented in practice in some companies</li> <li>✓ Understand that those principles are also applicable for large corporations wishing to better capture the needs from their customers when developing new products</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. The lean startup principles</li> <li>2. Developing and testing the vision <ul style="list-style-type: none"> <li>• Origin of the lean startup</li> <li>• What is a startup?</li> <li>• The importance of learning in a startup</li> <li>• Experimenting the strategy</li> </ul> </li> <li>3. Developing the Build-Measure-Learn process <ul style="list-style-type: none"> <li>• Build-Measure-Learn feedback loop</li> <li>• Building a minimum viable product (MVP)</li> <li>• Measuring progress</li> <li>• Establish the baseline</li> <li>• Tuning the engine</li> <li>• Pivot or persevere</li> </ul> </li> <li>4. Accelerate: start the engine <ul style="list-style-type: none"> <li>• Run small batches</li> <li>• Unleashing growth</li> </ul> </li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	Digital 2 - Ideation



Digital 4	Agile methodologies
<b>Length of the module</b>	35 minutes – Beginner level
<b>Context and learning objectives</b>	<p>Agile methodologies are new project management methods based on close collaboration, transparent communication and self-organized teams. They are particularly adapted for companies willing to adapt their working methods to the acceleration of new products and applications developments.</p> <ul style="list-style-type: none"> <li>✓ Discover the main principles of Agile methodologies</li> <li>✓ Learn about the practices, values and habits of Agile methodologies</li> <li>✓ Understand how they allow companies to implement a new products development methodology</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. What are Agile methods? <ul style="list-style-type: none"> <li>• Origin and evolution</li> <li>• General principles</li> <li>• Practical principles</li> </ul> </li> <li>3. Overview of the main Agile methods <ul style="list-style-type: none"> <li>• Scrum</li> <li>• Dynamic systems development method</li> <li>• Use of the methods</li> </ul> </li> <li>4. Project management and Agile methods <ul style="list-style-type: none"> <li>• Project management and Agile methods</li> </ul> </li> <li>5. Agile methods and project risk <ul style="list-style-type: none"> <li>• Importance of project risk management</li> <li>• Risk subjectivity and sources of project risk</li> <li>• Agile project risk management</li> </ul> </li> <li>6. Conclusion</li> </ol>
<b>Prerequisite</b>	Digital 1 - Introduction



Digital 5	Emergence of new waves and technologies (part 1)
<b>Length of the module</b>	28 minutes – Beginner level
<b>Context and learning objectives</b>	<p>For traditional insurance companies, to stay competitive understanding the fast evolution of technology is a must. In this module, we will present topics related to new waves and trends in Insurance.</p> <ul style="list-style-type: none"> <li>✓ Discover about the new actors and how they are changing the financial and insurance landscape</li> <li>✓ Learn about the Internet of things (IoT) and its applications</li> <li>✓ Get some insights of practical use cases of IoT in general and potential use cases for the insurance business</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. New insurance waves: Fintech, Insurtech <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Relationships with existing parties</li> <li>• Facilitations and barriers for adoption</li> </ul> </li> <li>3. IoT concept and application sectors <ul style="list-style-type: none"> <li>• Introduction</li> <li>• What is IoT?</li> <li>• IoT and insurance</li> <li>• IoT: risks and limits</li> </ul> </li> <li>4. Conclusion</li> </ol>
<b>Prerequisite</b>	Digital 1 - Introduction



<b>Digital 6</b>	<b>Emergence of new waves and technologies (part 2)</b>
<b>Length of the module</b>	43 minutes – Beginner level
<b>Context and learning objectives</b>	<p>For traditional insurance companies, to stay competitive understanding the fast evolution of technology is a must. In this module, we will present additional topics related to new waves and trends in Insurance.</p> <ul style="list-style-type: none"> <li>✓ Learn about technologies that have the potential, or already change the insurance industry. These technologies include big data, artificial intelligence (AI), machine learning (ML), chatbots and blockchain</li> <li>✓ Per technology we will learn about what they are, their impact in the industry and on the customer relationship as well as their potential applications</li> <li>✓ Understand how, as a company, to embrace technology and its opportunities</li> </ul>
<b>Table of content</b>	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Big data, AI &amp; Machine learning <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition of big data</li> <li>• Interest of AI and ML concept</li> <li>• Business cases in insurance</li> </ul> </li> <li>3. Chatbot <ul style="list-style-type: none"> <li>• Introduction</li> <li>• What is a chatbot?</li> <li>• Why a chatbot?</li> <li>• How to create a chatbot?</li> <li>• Some applications in insurance</li> </ul> </li> <li>4. Blockchain <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Purpose</li> <li>• Process</li> <li>• Structure</li> <li>• Security</li> <li>• Cryptocurrencies</li> <li>• Limits</li> <li>• Smart contract applications</li> </ul> </li> <li>5. Conclusion</li> </ol>
<b>Prerequisite</b>	Digital 5 - Emergence of new waves and technologies (part 1)



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