### Assignment 1 — Exploring Big Data Analytics

1. Big Data and Technology—The Future of Insurance
   1. Strategic Opportunities From Big Data and Technology
   2. Big Data
   3. Technology
   4. Data Science
   5. Strategic Applications to Insurance
2. Evolution of Big Data
   1. Big Data 1.0
   2. Big Data 2.0
3. Big Data Characteristics and Sources
   1. Data Characteristics
   2. Internal and External Data
      1. Internal Data
      2. External Data
   3. Structured and Unstructured Data
4. Data Quality
   1. Data Quality Defined
   2. Metadata
   3. Methods to Identify Inaccurate or Missing Data
      1. Quantitative Data
      2. Categorical Data
   4. Data Security
5. Data Mining
   1. Data Mining Techniques
   2. Developing a Predictive Model
   3. The Data Mining Process
6. Data Science
   1. Data Science Concepts
   2. The Data Scientist
   3. The Data Science Team
7. Data-Driven Decision Making
   1. Data Science and Data-Driven Decision Making
      1. The Descriptive Approach
      2. The Predictive Approach
   2. A Model for Data-Driven Decision Making in Risk Management and Insurance

### Assignment 2 — Predictive Modeling Concepts

1. Basic Modeling Concepts
   1. Supervised Versus Unsupervised Learning
   2. Predictive Versus Descriptive Modeling
   3. Algorithms
   4. Entropy
   5. Lift
2. Similarity and Distance
   1. Measuring Similarity and Distance
   2. Applications of Similarity and Distance
      1. Nearest Neighbors
      2. Measuring Similarity in Networks
3. Training and Evaluating a Predictive Model
   1. Training the Model
      1. Training Data
      2. Holdout Data
      3. Cross-Validation
4. Evaluating the Model
   1. Performance Metrics
   2. Putting the Model into Production

Assignment 3 — Traditional Analysis Techniques for Big Data

1. Traditional Data Analysis Techniques
   1. Exploratory Data Analysis
   2. Classification Trees
   3. Regression Models
   4. Cluster Analysis
2. Classification Trees
   1. Classification Tree Model
   2. Classification Rules
   3. Probability Estimation Tree
3. Linear Functions
   1. Linear Discriminants
   2. Linear Regression
      1. Multiple Regression
      2. Disadvantages of Linear Models
   3. Generalized Linear Models
   4. Logistic Regression
4. Cluster Analysis
   1. Cluster Analysis
   2. Hierarchical Clustering
   3. K Nearest Neighbors Algorithm
   4. K-Means Clustering Algorithm
   5. Describing Clusters

Assignment 4 — Text Mining, Social Network Analysis, and Neural Networks

1. Text Mining
   1. Retrieve and Prepare Text
   2. Create Structured Data from Unstructured Data
   3. Create a Model Using Data Mining Techniques
   4. Evaluate the Text Mining Model
2. Social Network Analysis
   1. Introduction to Social Network Analysis
   2. Link Analysis
   3. Social Network Metrics
   4. Network Classification
3. Neural Networks
   1. Mechanics of Neural Networks
   2. Applications of Neural Networks

### Assignment 5 — Technology and Smart Products

1. Emerging Technology for Underwriting, Claims, and Risk Management
   1. Artificial Intelligence
   2. Wireless Sensor Networks
   3. Computer Vision
2. How Smart Products Apply to Risk Management
   1. Property Management
   2. Supply Chain Management
   3. Transportation Management
   4. Catastrophe Management
   5. Workplace Safety Management
   6. Construction and Engineering Management

### Assignment 6 — Underwriting Applications of Big Data Analytics

1. Automobile Ratemaking Using Vehicle Telematics
   1. Traditional Automobile Rating Attributes
   2. Vehicle Telematics
   3. Telematics’ Effect on Ratemaking
2. Segmenting Homeowners Policies Using Machine Learning
   1. Need for Rate Adjustment
   2. Identifying Loss Ratio Segments With Machine Learning
   3. Evaluating the Effect of Machine Learning on Homeowners Policies
3. Underwriting Products Liability Risks Using Data Mining
   1. Discovering Emerging Risks
      1. Cluster Analysis
      2. Text Mining
   2. Predictive Modeling for Emerging Risks

### Assignment 7 — Claims Applications of Big Data Analytics

1. Detecting Claims Fraud with Network Analysis and Clustering
   1. Detecting Claims Fraud
   2. Applying Network Analysis
   3. Applying Cluster Analysis
2. Using Classification Tree Analysis in Claims Assignment
   1. Overview of the Procedure
   2. Information Gain by Complex Claims Attributes
   3. Using a Classification Tree to Illustrate Attributes of Complex Claims
   4. Validating the Complex Claim Model
   5. Complex Claims Reporting
3. Improving Claims Processes with Business Process Analytics
   1. Overview of the Procedure
   2. Business Process Analytics and Claims
   3. Process Mining Applied to Claims
   4. Improving Claims Processes with Data Analytics

### Assignment 8 — Risk Management Applications of Big Data Analytics

1. Preventing Employee Injuries With Sensor Data
   1. Traditional Workplace Accident Analysis Techniques
   2. Sensor-Generated-Data Analysis Techniques
2. Assessing Reputation Risk Through Text Mining and Social Network Analysis
   1. Reputation Risk
   2. Text Mining
   3. Social Network Analysis
3. Using Clustering and Linear Modeling for Loss Development
4. Overview of the Procedure
5. Collect and Organize Past Data
6. Apply Data Analysis Techniques
7. Develop a More Accurate Method to Predict Losses

### Assignment 9 — Implementing a Data Analytics Strategy

* 1. Data Analytics Strategy
     1. Reinforcing Strengths
        1. Mitigating Weaknesses and Threats
        2. Exploiting Opportunities
  2. Data Analytics Risk Management
     1. Scan Environment
        1. Internal Environment
        2. External Environment
     2. Identify Risks
     3. Analyze Risks
     4. Treat Risks
     5. Monitor and Assure
  3. Data Analytics Change Management
     1. Articulate the Need for Change
     2. Appoint a Leadership Team
     3. Develop a Written Statement of the Vision and Strategies
     4. Communicate the Vision and Strategies
     5. Eliminate Barriers to Change
     6. Recognize Incremental Successes
     7. Entrench the Change