**Course Description**

Many times in machine learning, the goal is to find patterns in data without trying to make predictions. This is called unsupervised learning. One common use case of unsupervised learning is grouping consumers based on demographics and purchasing history to deploy targeted marketing campaigns. Another example is wanting to describe the unmeasured factors that most influence crime differences between cities. This course provides a basic introduction to clustering and dimensionality reduction in R from a machine learning perspective, so that you can get from data to insights as quickly as possible.

**1Unsupervised learning in R**FREE

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The k-means algorithm is one common approach to clustering. Learn how the algorithm works under the hood, implement k-means clustering in R, visualize and interpret the results, and select the number of clusters when it's not known ahead of time. By the end of the chapter, you'll have applied k-means clustering to a fun "real-world" dataset!

* [**Welcome to the course!50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=1)
* [**Identify clustering problems50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=2)
* [**Introduction to k-means clustering50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=3)
* [**k-means clustering100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=4)
* [**Results of kmeans()100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=5)
* [**Visualizing and interpreting results of kmeans()100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=6)
* [**How kmeans() works and practical matters50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=7)
* [**Handling random algorithms100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=8)
* [**Selecting number of clusters100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=9)
* [**Introduction to the Pokemon data0 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=10)
* [**Practical matters: working with real data100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=11)
* [**Review of k-means clustering50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/unsupervised-learning-in-r?ex=12)

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**2Hierarchical clustering**

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Hierarchical clustering is another popular method for clustering. The goal of this chapter is to go over how it works, how to use it, and how it compares to k-means clustering.

* [**Introduction to hierarchical clustering50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=1)
* [**Hierarchical clustering with results100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=2)
* [**Selecting number of clusters50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=3)
* [**Interpreting dendrogram50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=4)
* [**Cutting the tree100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=5)
* [**Clustering linkage and practical matters50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=6)
* [**Linkage methods100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=7)
* [**Comparing linkage methods50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=8)
* [**Practical matters: scaling100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=9)
* [**Comparing kmeans() and hclust()100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=10)
* [**Review of hierarchical clustering50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/hierarchical-clustering?ex=11)

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**3Dimensionality reduction with PCA**

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Principal component analysis, or PCA, is a common approach to dimensionality reduction. Learn exactly what PCA does, visualize the results of PCA with biplots and scree plots, and deal with practical issues such as centering and scaling the data before performing PCA.

* [**Introduction to PCA50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=1)
* [**PCA using prcomp()100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=2)
* [**Results of PCA50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=3)
* [**Additional results of PCA100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=4)
* [**Visualizing and interpreting PCA results50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=5)
* [**Interpreting biplots (1)50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=6)
* [**Interpreting biplots (2)50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=7)
* [**Variance explained100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=8)
* [**Visualize variance explained100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=9)
* [**Practical issues with PCA50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=10)
* [**Practical issues: scaling100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=11)
* [**Additional uses of PCA and wrap-up50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/dimensionality-reduction-with-pca?ex=12)

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**4Putting it all together with a case study**

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The goal of this chapter is to guide you through a complete analysis using the unsupervised learning techniques covered in the first three chapters. You'll extend what you've learned by combining PCA as a preprocessing step to clustering using data that consist of measurements of cell nuclei of human breast masses.

* [**Introduction to the case study50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=1)
* [**Preparing the data100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=2)
* [**Exploratory data analysis50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=3)
* [**Performing PCA100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=4)
* [**Interpreting PCA results100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=5)
* [**Variance explained100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=6)
* [**Communicating PCA results50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=7)
* [**PCA review and next steps50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=8)
* [**Hierarchical clustering of case data100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=9)
* [**Results of hierarchical clustering50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=10)
* [**Selecting number of clusters100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=11)
* [**k-means clustering and comparing results100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=12)
* [**Clustering on PCA results100 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=13)
* [**Wrap-up and review50 xp**](https://campus.datacamp.com/courses/unsupervised-learning-in-r/putting-it-all-together-with-a-case-study?ex=14)