

LECTURE / SESSION¹ PLAN

Name Lecturer: Sofia Gil-Clavel	Date session: 4	Expected number of students: 20
Course title	R-Workshop	
Topic of lecture or session	Machine Learning: Unsupervised Learning	
Situational factors (e.g. group size, prior knowledge, expected motivation)	The class lasts 3hrs. The students are in different career stages, from PhD students to professors. The students have different backgrounds, from qualitative researchers that have never used R to quantitative researchers that want to learn new topics or move out of SPSS/STATA. The students use different Operating Systems (Windows, Mac, or Linux).	
Intended learning outcomes of this session	At the end of the session the students will be able to: <ol style="list-style-type: none">1. Explain what machine learning is.2. Explain the difference between supervised and unsupervised learning.3. Perform dimensionality reduction.4. Visualize dimensionality reduction and interpret it.5. Perform clustering.	
Learning material (book, chapters, ...)	The lecture is based on the book: <ul style="list-style-type: none">• James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani, eds. <i>An Introduction to Statistical Learning: With Applications in R</i>. Springer Texts in Statistics 103. New York: Springer, 2013.	

¹ A session means a teaching and learning session for university students in the bachelor or master. It can be a lecture, a seminar or a specific type of educational meeting with a group of students that is relevant for the discipline where the lecturer can demonstrate a whole range of teaching skills. It means that in one session each of the six didactic elements appears at least once. Your lesson plan should show that you are using a powerful learning environment and that students are activated.

Media, equipment, tools	The students use their own laptops. The teacher needs access to a projector and a whiteboard.
Preparation for students	The students have access to the slides and codes before the class: https://github.com/SofiaG11/R_Course/tree/master/R4SocialScientists/Session4_UnsupervisedLearning

Time ² (min.)	Didactic element (goal) ³ and topic ⁴	What the teacher does ⁵ (teacher activity)	What students do (learner activity)	Evaluation ⁶ (feedback/assessment)
20	<ul style="list-style-type: none"> Explain what machine learning is. 	<ul style="list-style-type: none"> The teacher uses the slides to introduce the topic: Machine Learning. The teacher opens RStudio and opens the already written script that will be used during the class. 	<ul style="list-style-type: none"> Before telling each element the students learned, the teacher waits some seconds for the students to fill out the information out loud. The students open and follow the steps that the teacher is explaining. 	<ul style="list-style-type: none"> The students will use these concepts during the workshop. So, the teacher will detect when a student confuses them. Based on these confusions the teacher will be able to correct the student.
20	<ul style="list-style-type: none"> Explain the difference between supervised and 	<ul style="list-style-type: none"> The teacher uses the slides to explain the differences between supervised and unsupervised machine learning. 	<ul style="list-style-type: none"> The students passively digest what the teacher is explaining. 	<ul style="list-style-type: none"> The students will use these concepts during the workshop. So, the teacher will detect when a student confuses them. Based on these

² Indicate the planned duration in minutes

³ State the number(s) of the relevant ILO at each didactic element

⁴ Only key words

⁵ Specify the type of activity and write down also the questions that you prepared to ask in the session

⁶ Specify the type of evaluation, i.e. the way in which you assess if the objective(s) has/have been achieved

	unsupervised learning.	<ul style="list-style-type: none"> The teacher gives a quick overview of the topics that will be learned today. 		confusions the teacher will be able to correct the student.
30	<ul style="list-style-type: none"> Perform dimensionality reduction. 	<ul style="list-style-type: none"> The teacher uses the slides to motivate and explain dimensionality reduction. The teacher uses the slides to explain Principal Components Analysis. 	<ul style="list-style-type: none"> The students passively digest what the teacher is explaining. The students independently start filling out the missing parts of the R-script. This is based on what the teacher explained using the slides. 	<ul style="list-style-type: none"> The teacher walks around the classroom to check on the students and provide feedback when something is not working on their computers. When the teacher detects a common error, then the teacher uses the whiteboard to clarify.
10	<ul style="list-style-type: none"> Visualize dimensionality reduction and interpret it. 	<ul style="list-style-type: none"> The teacher uses the slides to explain how to visualize principal components and how to interpret them. 	<ul style="list-style-type: none"> The students passively digest what the teacher is explaining. The students independently start filling out the missing parts of the R-script. This is based on what the teacher explained using the slides. 	<ul style="list-style-type: none"> The teacher walks around the classroom to check on the students and provide feedback when something is not working on their computers. When the teacher detects a common error, then the teacher uses the whiteboard to clarify.
30	<ul style="list-style-type: none"> Perform clustering. 	<ul style="list-style-type: none"> The teacher uses the slides to motivate and explain clustering. The teacher uses the slides to explain some ways to perform clustering: <ul style="list-style-type: none"> K-means Hierarchical clustering 	<ul style="list-style-type: none"> The students passively digest what the teacher is explaining. The students independently start filling out the missing parts of the R-script. This is based on what the teacher explained using the slides. 	<ul style="list-style-type: none"> The teacher walks around the classroom to check on the students and provide feedback when something is not working on their computers. When the teacher detects a common error, then the

				teacher uses the whiteboard to clarify.
10	<ul style="list-style-type: none"> Visualize clustering and interpret it. 	<ul style="list-style-type: none"> The teacher uses the slides to explain how to visualize clusters and how to interpret them. 	<ul style="list-style-type: none"> The students passively digest what the teacher is explaining. The students independently start filling out the missing parts of the R-script. This is based on what the teacher explained using the slides. 	<ul style="list-style-type: none"> The teacher walks around the classroom to check on the students and provide feedback when something is not working on their computers. When the teacher detects a common error, then the teacher uses the whiteboard to clarify.