

## LECTURE / SESSION<sup>1</sup> PLAN

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| <b>Name Lecturer:</b><br>Sofia Gil-Clavel                                   | <b>Date session:</b><br>May 30th, 2025.   | <b>Expected number of students:</b><br>20 |
| Course title  | R-Workshop  |   |
| Topic of lecture or session   | Basic concepts before code parallelization  |   |
| Situational factors (e.g. group size, prior knowledge, expected motivation) | The class lasts 3hrs.<br>The students are in different career stages, from PhD students to professors.<br>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.<br>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"><li>1. Explain what branches and loops are.</li><li>2. Translate problems into pseudocode.</li><li>3. Translate pseudocode into R-code.</li><li>4. Explore the properties of R to optimize loops</li><li>5. Write functions</li><li>6. Use the R functions lapply, vapply, etc. to speed-up code.</li></ol> |   |
| Learning material (book, chapters, ...)                                     | The lecture is based on the book: <ul style="list-style-type: none"><li>• Wickham, Hadley. <i>Welcome / Advanced R</i>. Accessed March 31, 2025. <a href="https://adv-r.hadley.nz/">https://adv-r.hadley.nz/</a>.</li></ul>   |   |

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<sup>1</sup> 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.

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| Media, equipment, tools  | The students use their own laptops.<br>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.                               |

| Time <sup>2</sup><br>(min.) | Didactic element<br>(goal) <sup>3</sup> and topic <sup>4</sup>                         | What the teacher does <sup>5</sup><br>(teacher activity)   | What students do<br>(learner activity)  | Evaluation <sup>6</sup><br>(feedback/assessment)   |
|-----------------------------|--|--|---|--|
| 10                          | <ul style="list-style-type: none"> <li>Explain what branches and loops are.</li> </ul> | <ul style="list-style-type: none"> <li>The teacher uses the slides to motivate and explain what branches and loops are.</li> <li>The teacher opens RStudio and opens the already written script that will be used during the class.</li> </ul> | <ul style="list-style-type: none"> <li>The students passively digest what the teacher is explaining.</li> <li>The students open and follow the steps that the teacher is explaining.</li> </ul>                           | <ul style="list-style-type: none"> <li>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.</li> </ul> |
| 20                          | <ul style="list-style-type: none"> <li>Translate problems into pseudocode.</li> </ul>  | <ul style="list-style-type: none"> <li>The teacher uses the slides to explain what pseudocode is.</li> </ul>   | <ul style="list-style-type: none"> <li>The students passively digest what the teacher is explaining.</li> <li>The students perform an exercise where they translate a common everyday problem into pseudocode.</li> </ul> | <ul style="list-style-type: none"> <li>The teacher walks around the classroom to check on the students and provide feedback their pseudocode. When the teacher detects a common</li> </ul>   |

<sup>2</sup> Indicate the planned duration in minutes

<sup>3</sup> State the number(s) of the relevant ILO at each didactic element

<sup>4</sup> Only key words

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

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

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|    |   |   |  | error, then the teacher uses the whiteboard to clarify.  |
| 20 | <ul style="list-style-type: none"> <li>Translate pseudocode into R-code.</li> </ul>             | <ul style="list-style-type: none"> <li>The teacher uses the slides to show students the process of translating their pseudocode into R-code.</li> </ul>   | <ul style="list-style-type: none"> <li>The students translate their pseudocode into R-code.</li> </ul>   | <ul style="list-style-type: none"> <li>The teacher walks around the classroom to check on the students and provide feedback their R-codes. When the teacher detects a common error, then the teacher uses the whiteboard to clarify.</li> </ul>                                    |
| 20 | <ul style="list-style-type: none"> <li>Translate everyday problems into R-code.</li> </ul>      | <ul style="list-style-type: none"> <li>The teacher uses the slides to introduce a problem where the students have to translate three different problem into R-code. All these problems involve using branches and loops.</li> </ul> | <ul style="list-style-type: none"> <li>The students independently start working on their R-script. This is based on what the teacher explained using the slides.</li> </ul>  | <ul style="list-style-type: none"> <li>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.</li> </ul> |
| 30 | <ul style="list-style-type: none"> <li>Explode the properties of R to optimize loops</li> </ul> | <ul style="list-style-type: none"> <li>The teacher uses the slides to explain the properties of R vectors and how they can be used to speed-up processes.</li> </ul>  | <ul style="list-style-type: none"> <li>The students passively digest what the teacher is explaining.</li> <li>The students independently start working on translating their R-scripts using these properties.</li> </ul> | <ul style="list-style-type: none"> <li>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.</li> </ul> |

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| 30 | <ul style="list-style-type: none"> <li>• Write functions</li> </ul>  | <ul style="list-style-type: none"> <li>• The teacher uses the slides to explain how to write functions.</li> </ul>   | <ul style="list-style-type: none"> <li>• The students passively digest what the teacher is explaining.</li> <li>• The students independently start filling out the missing parts of the R-script. This is based on what the teacher explained using the slides.</li> </ul> | <ul style="list-style-type: none"> <li>• 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.</li> </ul> |
| 30 | <ul style="list-style-type: none"> <li>• Use the R functions lapply, vapply, etc. to speed-up code.</li> </ul> | <ul style="list-style-type: none"> <li>• The teacher uses the slides to explain the motivation and logic behind using the “apply” R functions and how to use them together with their self-written functions.</li> </ul> | <ul style="list-style-type: none"> <li>• The students passively digest what the teacher is explaining.</li> <li>• The students independently start working on the problem. This is based on what the teacher explained using the slides.</li> </ul>                        | <ul style="list-style-type: none"> <li>• 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.</li> </ul> |