



Pilot Course Curriculum and Intervention Plan for Computer Architecture (ULE)

**“Improving the quality and sustainability of
learning using early intervention methods based
on learning analytics”**

Project No. 2023-1-FI01-KA220-HED-000159757



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Table of Content

1	General course information>	4
2	Motivation and purpose (Why)	4
3	Defining more precisely what to explore (What)	5
4	Data collection strategy (How)	6
5	Data analysis and interpretation (So What)	7
6	Interventions plan (Now What)	7

1 General course information

Course name	Computer Architecture
Institution	University of Leon
Course level	Undergraduate
Teaching model	In-person
Course learning objectives	<ul style="list-style-type: none"> • Knows and understands the fundamentals of computer architecture, as well as the basic components that comprise them. • Knows and applies methodologies and tools for estimating and comparing computer performance. • Know the fundamentals of Big Data and cloud computing: architectures, services and applications. • Know the fundamentals of developing data capture, storage, intelligent analysis and visualization applications using Big Data tools. • Know how to detect possible applications of cloud computing in the context of Industry 4.0.

2 Motivation and purpose (Why)

Goal of the inquiry	
What do you want to learn about the teaching and learning process?	<p>Assess students' level of engagement in theoretical and practical activities.</p> <p>Identify how early intervention methods based on learning analytics can improve academic performance.</p> <p>How do students interact with learning materials and proposed activities?</p> <p>Is regular engagement correlated with better results?</p> <p>Which learning resources are most effective for students?</p>

3 Defining more precisely what to explore (What)

Specific questions of interest	
Key inquiry questions	<ol style="list-style-type: none">1. How engaged are students in practical and design activities?2. How much do students engage in class preparation activities?3. What impact does personalized feedback based on learning analytics have?
Data sources	<p>Activity logs from the learning management system (Moodle).</p> <p>Submissions of the projects.</p> <p>Weekly self-regulation (SRL) surveys.</p> <p>Student feedback and peer assessment of results.</p> <p>Evaluation of fundamentals of the activities</p>

4 Data collection strategy (How)

Data sources		<ul style="list-style-type: none"> • Learning Management Tools (LMT) • Github classroom • Weekly SRL surveys 	
Data aggregation		Data will be collected in xAPI format and integrated into Learning Locker either directly from the LMS plugin or through the csv2xAPI tool developed within the ISILA project	
Detailed methods for data collection			
Week#	Topic	Learning activities and materials	Data source(s) and collection method(s)
1	Introduction to CUDA	Introduction to the system and first examples with CUDA	Interaction with slides and videos, logged in the course LMS Attendance and participation logs
2	CUDA memory	Differences between shared and global memory in GPU. Explain the first deliverable (CUDA exercise in Github)	Attendance and participation logs
3	CUDA individual work	Elaborate first deliverable and upload to github	Assignment submissions and SRL surveys
4	RISC V Review	Review of the instructions of RISC V	Attendance and participation logs
5	Pipelined RISC V	Explain Pipelined RISC V with the web tool	Attendance and participation logs
6	Benchmarking	Explain how get metrics from tool Explain the second deliverable (RISC V codes with metrics in Github)	Assignment submissions and SRL surveys

7	Review of C++ examples	Introduction to algorithms in C++	Attendance and participation logs Evaluation of concepts of first and second deliverables
8	Introduction to OpenMP	Introduction to the OpenMP	Attendance and participation logs
9	BSC Tools	Installation of Barcelona Supercomputing Center Tools (BSC)	Attendance and participation logs
10	OpenMP Loop	Lecture of different methods to distributed workload with OpenMP	Attendance and participation logs
11	OpenMP Sections	Lecture of different methods to distributed workload with OpenMP	Analysis of results and class participation
12	Optimize algorithms	Work on the different optimizations over the proposed algorithms	Attendance and participation logs
13	Measure optimizations	Use of BSC Tools for analyse optimizations	Attendance and participation logs
14	Final delivery	Elaborate third deliverable and upload to github	Assignment submissions and SRL surveys
15	Final evaluation		Evaluation of concepts of third deliverable

5 Data analysis and interpretation (So What)

Sense making and interpretation context	Use dashboards to visualize engagement levels. Analyze correlations between activities and learning outcomes. Identify students with low participation levels for personalized interventions.
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6 Interventions plan (Now What)

Potential interventions	Individual-level: face-to-face interventions during the laboratory sessions and Offer personalized tutoring and additional support for at-risk students. Design Improvements: Simplify less effective learning resources and add interactive examples.
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