

CLIL Module Plan

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School Grade	☐ Primary		☐ Middle		☒ High	
School Year	☐ 1	☐ 2	☐ 3	☒ 4		☐ 5
Subject	Informatica	Topic		Inter-process communication		
CLIL Language	☒ English			☐ Deutsch		

Personal and social-cultural preconditions of all people involved	School context: This unit is given in the course of TPSIT subject (Tecnologie e progettazione di sistemi informatici e di telecomunicazioni), where teaching consists of 4 hours per week: 2 hours in the laboratory (practical activities) and 2 in the classroom (theoretical lessons). This plan refers to a module composed by: A theoretical lesson that will be delivered in the classroom: it is important to have an interactive whiteboard and, if possible, a spacious room. Two practical lessons that will be delivered in a computer laboratory, equipped with one PC for each student. Class group: The class is composed by 22 students, one of whom is slightly dyslexic. Three subgroups can be identified. About one third of the class excels in all scientific subjects. Most of the remaining pupils, while not showing exceptional results, demonstrate participation and maintain an adequate study level. Only a small minority is generally disinterested and/or underprofitable. Pupils are very disciplined and the climate during the lessons is positive: this has allowed rapid progress, leading to good learning levels. Students aren't used to work together and to cooperate during lessons. Many of them are worried (maybe ashamed) about having to speak English. Almost all of them have an intermediate level of English (B1 or B2); they are Italian and no one is native English speaker. Previously the students had a short experience of CLIL. Teacher: The unit has not a frontal approach, so the teacher should be comfortable with team coaching approach. In addition, he should have some previous experience in conducting role-playing games.
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Students' prior knowledge, skills, competencies	Subject	Language
	They know what are threads, and how the operating system (or the virtual machine) manages them. They know problems that may arise in multi-threading systems, especially in shared memory context. They are able to create multi-thread programs with shared data. They are able to identify thread starvation and deadlock situations. They are aware that some mechanisms are needed to allow thread synchronization and to avoid data corruption.	Almost all students have an intermediate level of English (B1 or B2). They have good listening and reading skills, can ask for clarifications and are able to understand and to use basic tenses, conditional forms and other basic grammar structures. They already know many technical terms related to the subject.

Timetable fit	© Module	Length 14
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Description of teaching and learning strategies	Prior to the first lesson of the unit a flipped classroom task must be activated: it consists in watching a video at home and identifying the meaning of 6 key concepts. Using edpuzzle (www.edpuzzle.com) the teacher can track students' homework (know if students are watching the video, how many times per section and if they're understanding the content). After the word matching exercise a role-play game is activated: this kind of activity accommodates different learning styles (including kinaesthetic ones) while promoting interaction and communication in L2. Finally a kahoot game (www.kahoot.com) is used as formative self-assessment. Language scaffolding is achieved thanks to the use of subtitles in the video and, in the role-play, giving instruction sheets with sentence examples. Code-switching is allowed and may also be used by the teacher according to the situation. Students are asked to draw a mind-map of semaphores as homework: this activity helps content scaffolding; They also have to hold and study word-matching sheet, and the video will be available till the end of the course. As result of the unit, students should know: What is a semaphore. What are the differences between semaphores (standard vs complex, busy-waiting vs sleep-while-waiting). What do P and V functions do (wait and signal operations). Students should be able to: Describe semaphore operation. Simulate semaphore operations in their mind (in the following lessons, especially in the laboratory, the ability to create synchronized programs will be developed: this is a key objective of the module and is based on the ability to mentally simulate semaphores). Correctly call P and V functions from a thread to access a semaphore. Pupils should also be aware that: Different types of semaphores should be used in different situations. A semaphore can be used to handle concurrent access to a resource. Semaphores can be used to synchronize threads. The first lesson will need 50 minutes, however the role-p
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Overall Module Plan

Unit: 1 IPC Introduction Unit length: 4	Lesson 1 Introduction
	Lesson 2 Why IPC?
	Lesson 3 Lab: Multithreading and shared memory
Unit: 2 IPC basics Unit length: 4	Lesson 1 Conflict avoidance: critical sections and mutual exclusion
	Lesson 2 Concurrency problems
	Lesson 3 Lab: Java multithreading IPC - sleep and join
Unit: 3 Synchronization basics Unit length: 9	Lesson 1 Semaphores introduction
	Lesson 2 Lab: Semaphores and Java threads
	Lesson 3 Lab: Blocking sequences.
	Lesson 4 Lab: Rendez-vous
	Lesson 5 Final Test

CLIL Lesson Plan

Unit number	1	Lesson number	1	Title	Introduction
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	15	Activate prior knowledge and correct misconceptions. Warm up basic interpersonal communication skills and language. Get in touch with basic technical vocabulary.	Teacher welcomes the students and introduces brainstorm. Brainstorm about IPC (Inter Process Communication). Teacher should do a little resume linking concepts expressed by the students with real world situations.	Skills L S R W Key vocabulary Inter process communication, process, thread, multithread, concurrent programming, shared data.	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	--	Feedback during the class. Interaction observation.
				Communicative structures What does this remind you? What does this means for us? What else do we need to know or explore? What have you noticed about ?			

2	25	Be able to give a definition of IPC and comment it. Know basic technical terms	Defining IPC: short video introducing IPC will be viewed twice (for better understanding). After that, students are asked to work in pairs to write a definition of IPC according to what they understood from the video. They have 10 minutes to do that. Definition will be presented and discussed in plenary.	Skills L S R W Key vocabulary Cooperating processes, message passing, shared memory, memory protection, microkernel, memory area. Communicative structures We can define the IPC as ... Basic features are... The main goal is...	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	link (form 0.00 to 2.00)	Feedback during the class. Pair work observation.
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3	10	Know the definition of IPC Know IPC context Be aware of module focus, lessons layout and evaluation parameters.	Taking a cue from what arose during the class, the teacher should present: a) a correct and complete definition of IPC b) a resume of IPC context. The teacher will briefly introduce module plan and evaluation parameters: Homeworks will count 20% of the mark Classroom activities will count 30% Final test will count for the 50% of the mark	Skills L S R W Key vocabulary concurrent programming, independent and cooperating processes, communication models, multiprocessing, multithreading, parallel processing. Communicative structures It refers specifically to ... It allows to ...	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	---	--
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CLIL Lesson Plan

Unit number	1	Lesson number	2	Title	Why IPC?
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment				
1	20	Revise and use key vocabulary used in first lesson Recall definition and application context of IPC Interpreting evidences form real word applications. Highlight which features of a software are based on the IPC.	Teacher has to introduce lesson organization and first activity. Working in pairs, students have to watch some application screenshot and: 1 relate a statement that describes it (5 minutes) 2 write some considerations about IPC use in that software (which functionalities are relying on IPC, is IPC mandatory or optional in that situation? ...) 10 minutes correction is done in plenary	Skills	☒ Whole class ☐ Group work ☒ Pair work ☐ Individual work	• U1_L2_ALL1.pdf U1_L2_ALL1.pdf	Feedback during the class.				
				<table><tr><td>L</td><td>S</td><td>R</td><td>W</td></tr></table>				L	S	R	W
				L				S	R	W	
Key vocabulary Multi-tasking, multi-threading, shared resource, foreground task, background task, cooperating processes, multiprocessing. Communicative structures IPC offers IPC is embedded in Many applications use IPC rather than because ...											

2	25	Review technical terms Outline IPC features Interpreting a technical document Agree the key points of the IPC with peers	The attached text is given to the students. They have 5 minutes to skim the text. Then, students will work in groups of 3 or 4. Relying on that document and on previous lesson materials they have to discuss, identify and write why it's important to provide IPC mechanisms in O.S. Correction is done in plenary, with teacher support.	Skills L S R W Key vocabulary synchronization, operating system, modularity, cooperating and independent processes, shared memory, message passing, virtual memory Communicative structures It is necessary in order to... My opinion is ... Its potential is ... This can be explained by referring to ..	☒ Whole class ☒ Group work ☐ Pair work ☒ Individual work	• U1_L2_ALL2.pdf Text: U1_L2_ALL2.pdf	Evaluation of the document produced by each group. Evaluation of work within the group.
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3	5	Find informations about Bernstein's conditions surfing the Internet. Select and summarize valid informations. Create a procedure.	Homework: search internet for “Bernstain's conditions” and draw a procedure flow chart that can be used to apply conditions.	Skills L S R W Key vocabulary sequential process, parallel process, multiprocessing constraints, parallelism in algorithms, flow independence, output independence, anti dependence. Communicative structures Check if ... Evaluate whether ...	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	(optional Edmodo platform to share homeworks with the teacher)	Evaluation of produced document.
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CLIL Lesson Plan

Unit number	1	Lesson number	3	Title	Lab: Multithreading and shared memory
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment				
1	15'	Know Bernstein's conditions. Be aware of main issues connected to IPC. Be able to identify critical situation in shared memory IPC	One or two students are asked to write on the blackboard Bernstein's conditions and application flow-chart. Teacher will facilitate a discussion about its applicability.	Skills	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	---	Students' interactions				
				<table><tr><td>L</td><td>S</td><td>R</td><td>W</td></tr></table>				L	S	R	W
				L				S	R	W	
Key vocabulary sequential process, parallel process, multiprocessing constraints, parallelism in algorithms, flow independence, output independence, anti dependence.											
				Communicative structures Can you list B.'s conditions? What can you say about ...? The relationship between ... and ... To test B.'s conditions...							

2	15'	Know Java basic functions used to handle multithreading. Be able to implement shared objects with Java. Apply a procedure to practical situation and validate process result.	Teacher has to introduce the activity showing a Java example of multi-threading and shared memory access (without synchronization). Students are asked to explain if Bernstein's conditions are satisfied in that example and why.	Skills L S R W Key vocabulary flow independence, output independence, anti dependence, synchronization, shared memory access. Communicative structures How would you use ...? Why do you think ... ? B.'s conditions are (aren't) satisfied because	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U1_L3_ALL1.pdf U1_L3_ALL1 - Basic example of IPC in JAVA Computer laboratory Netbeans IDE software Programming guide: link	Feedback during the class.
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3	50	Understand how to implement multithreading in JAVA Analyse the problem. Project and create a software to solve a problem. Test and validate the developed software. Explain the function of some parts of code (comments).	Teacher presents the problem to be solved by students. Each student has 45 minutes to create a program that solves the problem. Each code block must be commented in English. The teacher should supervise students and help them, clarify, explain, etc. **the student that first finished his task, can check with the teacher the code and correct it. Then he/she checks the code of the 2nd student and gives a feedback, and so on.	L S R W Skills Key vocabulary Thread, runnable, to extend, to implement, interrupt, exception, debug. Communicative structures What changes would you make to solve ...? What would you select ... ? How would you test ...? To avoid this situation I would ... This part of the code is used to ... This function performs This parameter defines ... ☐ Whole class ☐ Group work ☒ Pair work ☒ Individual work • U1_L3_ALL1.pdf U1_L3_ALL1 - Basic exercises on IPC in JAVA Computer laboratory Netbeans IDE software Programming guide: link Evaluation of produced software and comments to the code.
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4	20	Explain to the classmates. Justify a strategy. Debate with classmates about multithreading problems and possible solutions.	Teacher will identify the best solution: the student will briefly explain it to the class (10 minutes) Homework is assigned: Solve U1_L3_ALL2 problem and share the solution with the teacher using Edmodo (or email).	Skills L S R W Key vocabulary Thread, runnable, to extend, to implement, interrupt, exception. Communicative structures Why did you choose? I chose to use instead of ... I decided to replace ... with Would it be better if ...? Can you propose an alternative to ...? How would you adapt?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U1_L3_ALL2.pdf Homework: U1_L3_ALL2	Feedback during the class. Evaluation of the produced software and comments.
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CLIL Lesson Plan

Unit number	2	Lesson number	1	Title	Conflict avoidance: critical sections and mutual exclusion
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10	Locate errors in software code. Recall and apply IPC concepts. Propose solutions.	On the interactive whiteboard, the teacher shows blocks of code from homeworks containing most common errors. Students are required to identify errors and propose solutions. If necessary, the teacher suggests optimal solutions. The teacher, by asking questions during the correction, helps students to recall theoretical concepts of IPC.	Skills L S R W Key vocabulary Implement, extend, thread, runnable, exception, syntax error, interrupt, loop.	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	Interactive whiteboard connected to a PC with Edmodo platform or homeworks + netbeans	Feedback during the class. Evaluation of homeworks.

2	5	Know definitions of race condition, critical section and mutual exclusion. Recognize race conditions.	Teacher will briefly introduce the concept of critical-section and mutual exclusion as a possible solution to shared memory problems (use of presentation attached).	Skills L S R W Key vocabulary Race condition, timing, shared resource, critical section, primitive function, mutual exclusion. Communicative structures It ensure that... It is used for... A critical section can be identified by ... Mutual exclusion is needed to ...	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U2_L1_ALL1.pdf Power point (U2_L1_ALL1) and interactive white-board	--
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3	20	Locate important information in a technical document. Summarise and reorganize informations. Debate and agree a common position with classmates.	Each one has to read the text assigned to his group (text A for group A, text B for group B, and so on...). Then, each group will point out main points described in the document about critical section and mutual exclusion.	Skills L S R W Key vocabulary synchronization, critical section, segment/block of code, protocol, entry section, exit section, mutual exclusion, progress, bounded waiting, preemptive vs non-preemptive, interrupt, atomic instruction, mutex lock, spin lock. Communicative structures The list of important points I found ... The items I would choose are I think it is necessary to include ... What conclusions can we draw ...? How would you classify ..? What is your opinion ...?	☐ Whole class ☒ Group work ☐ Pair work ☒ Individual work	• U2_L1_ALL2.pdf Attachment U2_L1_ALL2	Feedback during the class.
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4	10	Outline relevant points about critical sections. Justify choices. Collect and list information during classmates' presentations.	Each group presents the important points that emerged from documents. Each student is asked to take notes and, as a homework, he/she will have to write a summary document on critical section and mutual exclusion (they will also have access to original documents shared through Edmodo).	Skills L S R W Key vocabulary synchronization, critical section, segment/block of code, protocol, entry section, exit section, mutual exclusion, progress, bounded waiting, preemptive vs non-preemptive, interrupt, atomic instruction, mutex lock, spin lock. Communicative structures What is ...? Can you explain what is meant ...? How would you classify ..? What is the relationship between ...? How would you justify ...? What data was used to conclude ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	--	Evaluation of homeworks.
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CLIL Lesson Plan

Unit number	2	Lesson number	2	Title	Concurrency problems
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10	Recall previously covered concepts. Memorize definition and key words.	A video on mutual exclusion is shown (link). Students are then asked to play a kahoot game with various questions related to IPC and mutual exclusion.	Skills L S R W Key vocabulary Lock variable, shared memory, mutual exclusion, mutex lock. Communicative structures --	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U2_L2_ALL1.pdf Youtube video: link Kahoot game with attached questions (U2_L2_ALL1)	Kahoot answers.

2	25	Experiment with IPC synchronization problems. Investigate cause and effect. Students improve their ability to interact and to analyze new problems. Students are able to explain and make examples about starvation and deadlock situations.	Active simulation of IPC problems through role-play: The teacher sets up and starts the following role-playing game: 4 students (A-B-C-D) will act as if they were independent processes. Teacher will act as the operating system (T). Other students will compile the observer sheet. See simulation instruction attached. After each simulation, a brief discussion about what happened and, optionally, about how to avoid possible problems.	Skills L S R W Key vocabulary Starvation, deadlock, synchronization, critical section, mutual exclusion, interrupt, race condition, shared resource. Communicative structures How is ... related to ...? Why do you think ...? Can you identify ...? Do you agree with ... ? How could you explain ...? What conclusions can you draw ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U2_L2_ALL2.pdf Process instruction sheets, observer instruction sheets, candies and sticks (U2_L2_ALL2)	Feedback during class.
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3	15	?	In groups of 3 and using observers sheets, students have to summarize the problems occurred (5 minutes). A plenary discussion on what happened and how to avoid that will follow. Homework: each group has to share on Edmodo a resume of IPC concurrency problems.	Skills L S R W Key vocabulary Starvation, deadlock, race condition, timing, shared resource, critical section, mutual exclusion, synchronization, progress, preemptive, non-preemptive, interrupt. Communicative structures From this I deduce that ... Can you assess the importance of ...? What would happen if ..? What conclusions can we draw ...? How would you classify ..? What is your opinion ...?	☒ Whole class ☒ Group work ☐ Pair work ☐ Individual work	--	Evaluation of produced documents. Feedback during the class.
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CLIL Lesson Plan

Unit number	2	Lesson number	3	Title	Lab: Java multithreading IPC - sleep and join
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10	Know sleep() and join() methods for Java threads. Locate information in a programming guide.	Using a PPT presentation the teacher introduces sleep() and join() methods and applications.	Skills	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U2_L3_ALL1.pdf PPT presentation: U2_L3_ALL1	Feedback during the class
				L S R W			
				Key vocabulary Sleep, join, thread, interrupt, timing, exception, execution time.			
				Communicative structures --			

2	50	Choose the appropriate functions. Interpret the text. Analyse the problem. Project and create a software to solve a problem. Test and validate the developed software. Explain the function of some parts of code (comments).	Teacher presents the problem to be solved. Each student has 45 minutes to create a program that solves the problem. Each code block must be commented in English. The teacher should supervise students and help them **the student that finishes his task first, can check with the teacher the code and correct it. Then he/she checks the code of the 2nd student and gives a feedback, and so on.	Skills L S R W Key vocabulary Sleep, join, thread, exception, try-catch. Communicative structures To avoid this situation I would This method performs... What changes would you make to solve ...? What way would you design ...? How would you test ...?	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	• U2_L3_ALL1.pdf U2_L3_ALL1 Exercises 1 and 2	Evaluation of developed programs and code comments
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3	25	Explain to the classmates. Justify a strategy. Debate with classmates the solution.	For each exercise a volunteer is asked to show and explain to the classmate his solution.	Skills L S R W Key vocabulary Sleep, thread, join, runnable, exception, try-catch, syntax error. Communicative structures An alternative to that ... may be ... It would be better to.... What choice have you made ...? How could you determine ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	--	Feedback during the class.
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CLIL Lesson Plan

Unit number	3	Lesson number	1	Title	Semaphores introduction
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
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1	20	Know the meaning of the main terms used in the context of thread synchronization. Recognize the differences between different types of semaphores. Locate important information while listening to an English-language video. Illustrate and discuss their choices with their peers.	Word-match exercise related to the concepts discussed in the video already watched at home (flipped classroom). The teacher introduces the work. The video is shown again, once only. Then, each student is given a worksheet for the word matching exercise. They have 5 minutes to complete the task, working individually. Correction will be done in subgroups of 3-4 students. The teacher has to support the work of the groups by promoting the use of the L2 language.	Skills L S R W Key vocabulary Semaphore, atomic method, critical data, wait and signal operation, busy waiting, critical section. Communicative structures Can you recall... ? Can you explain it in your own words? Which is the best answer ...? Can you list the functions of? ☐ Whole class ☒ Group work ☐ Pair work ☒ Individual work	• U3_L1_ALL1.pdf Word-match worksheets (see annex U3_L1_ALL1) EdPuzzle account and youtube video: link (from 0'10" to 4'43")	Flipped classroom activity is assessed by using Edpuzzle platform. Students' word-match worksheets and observation during group work.
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2	15	Recognize the behavior of semaphores. Reproduce the behavior of P and V primitives. Execute synchronization functions acting as threads / semaphores. Examine a synchronization problem and outline solution strategies. Model a semaphore and simulate it.	Role-play game. Teacher shall be the supervisor (or coach), but may also act as one of the players. Some students will be players in the simulation while others will be external observers. Detailed instructions are given in attached document. The teacher introduces the role-play and then asks who wants to volunteer (4 or 5 students). Then he gives the appropriate instruction sheet to each one of them. The teacher asks the others to act as external observers and to fill in the observation sheet.	Skills L S R W Key vocabulary Signal, notify (V function), wait (P function), queue, busy wait, scheduling policy, shared resource, starvation, deadlock, multi-thread. Communicative structures Can you predict the behavior of ...? This approach could lead to The function of is To avoid this situation I would ...	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U3_L1_ALL2.pdf Thread instruction sheets Observer instruction sheets Semaphore and scheduler instruction sheets	Feedback during the class. Interaction observation.
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3	12	List activities of the semaphore. Explain to the classmates what you noticed about the behavior of the “characters” playing the roles (threads, scheduler, traffic light, shared resource). Identify and justify problems that may arise in thread synchronization. Summarize semaphore behavior. Simulate the behavior of a semaphore. Debate with classmate about synchronization problem and possible solutions.	Debriefing of the role-play. Teacher should know debriefing techniques (a reference could be this book: Pearson M, Smith D: Debriefing in experience-based learning. Simulation/Games for Learning 1986). See attached document for possible questions/sentences that may support students' debate.	Skills L S R W Key vocabulary Semaphore, critical section, shared resource, first input – first output, queue, busy wait, starvation, deadlock, mutual exclusion. Communicative structures Which statements support ...? What is your opinion on...? An alternative to that ... may be ... The relationship between ... and is It would be better to....	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U3_L1_ALL3.pdf U3_L1_ALL3.pdf	Feedback during the class. Analysis of the observation sheets.
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4	3	Summarize semaphore behavior. Identify main aspects of synchronization through semaphores. Explain concepts through examples.	Lesson closing and homework assignment. Teacher will close the lesson and assign this homework: draw a mind-map of semaphores as synchronization mechanism. For each element in the mind-map write a short explication based on a practical example.	Skills L S R W Key vocabulary Semaphore, sleep-while-waiting, spin lock, busy-waiting, first input – first output queue, mutual exclusion, multi-thread. Communicative structures This feature is similar to This acts like ... An example of that It works like a	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	(optional: use edmodo platform to post homework)	Evaluate homework.
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CLIL Lesson Plan

Unit number	3	Lesson number	2	Title	Lab: Semaphores and Java threads
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10	Know where to find information on Java semaphores. Locate information in a programming guide. Choose relevant information from technical documents.	The teacher introduces use of semaphores in Java and Oracle programming guide.	Skills L S R W Key vocabulary Semaphore, multi-thread, counting semaphores, binary semaphores, concurrent programming, acquire and releaset. Communicative structures Can you recall... ? Can you select ...? Where is? How would you use ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	Computer laboratory. Netbeans IDE software. Programming guide: link	--

2	30	Understand how to use semaphores. Analyse the problem. Select optimal tools to implement a software solution Project and create a software to solve a problem. Test and validate the developed software. Explain the function of some parts of code (comments).	Teacher presents the problem to be solved by students. Each student has 30 minutes to create a program that solves the problem. The teacher could supervise students and help them, clarify, explain, etc.	Skills L S R W Key vocabulary Signal, notify, wait, queue, thread, runnable, join, concurrent. Communicative structures What changes would you make to solve ...? What way would you design ...? How would you test ...? To avoid this situation I would ...	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	• U3_L2_ALL1.pdf	Feedback during the class. Evaluation of produced software.
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3	10	List activities. Explain to the classmates. Justify a strategy. Debate with classmates about synchronization problems and possible solutions.	A volunteer can show and explain to the classmates his solution.	Skills L S R W Key vocabulary FIFO (first input – first output), queue, busy wait, starvation, deadlock, mutual exclusion. Communicative structures An alternative to that ... may be ... It would be better to.... What choice have you made ...? How could you determine ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	(optional: use edmodo platform to post homework)	Feedback during the class.
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CLIL Lesson Plan

Unit number	3	Lesson number	3	Title	Lab: Blocking sequences.
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment				
1	10	Recall semaphore theory Remember shared resource problems Analyze differences between shared memory access and sequence synchronization Compare various synchronization contexts	The teacher introduces blocking sequences.	Skills	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	Computer laboratory Netbeans IDE software Programming guide: link					
				<table><tr><td>L</td><td>S</td><td>R</td><td>W</td></tr></table>				L	S	R	W
				L				S	R	W	
Key vocabulary Semaphore, blocking sequence, multi-thread, concurrent programming, acquire and release.											
				Communicative structures Can you recall... ? Why do you think? How would you use ...? Can you identify the difference ...?							

2	60'	Recognize the blocking-sequence situation. Project and create a software to solve a blocking-sequence problem. Test and validate the developed software. Explain the function of some parts of code (comments).	Teacher presents the problem to be solved by students. Each student has 60 minutes to create a program that solves the problems.	Skills L S R W Key vocabulary blocking sequence, notify, wait, queue, thread, runnable, join, concurrent. Communicative structures What changes would you make to solve ...? What way would you design ...? How would you test ...? To avoid this situation I would	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	• U3_L3_ALL1.pdf U3_L3_ALL1.pdf	Feedback during the class. Evaluation of produced software.
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3	10	Explain to the classmates. Justify a strategy. Debate with classmates about solutions to blocking sequence problems.	A volunteer can show and explain to the classmate his solution. Homework: complete exercise.	Skills L S R W Key vocabulary Queue, starvation, deadlock, mutual exclusion. Communicative structures An alternative to that ... may be ... It would be better to.... What choice have you made ...? How could you determine ...?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	• U3_L3_ALL1.pdf Annex (optional: use edmodo platform to post homework)	Feedback during the class. Evaluation of homework.
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CLIL Lesson Plan

Unit number	3	Lesson number	4	Title	Lab: Rendez-vous
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment				
1	10	Recall Java semaphores features. Know what is rendez-vous in IPC. Compare various synchronization mechanisms.	The teacher explains what is rendez-vous in IPC. Brainstorming on how it can be implemented in Java using semaphores.	Skills	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	--	Feedback during class.				
				<table><tr><td>L</td><td>S</td><td>R</td><td>W</td></tr></table>				L	S	R	W
				L				S	R	W	
Key vocabulary Rendez-vous, semaphore, signal & wait, mutex, queue, synchronization.											
				Communicative structures How would you use ...? Why do you think ... ? What would you select ...? What way would you design ..?							

2	65	Understand rendez-vous mechanism. Interpret the text of the exercise. Project and develop a program that solves a problem. Test and validate developed program.	The teacher presents the exercises to be solved. Each student, working individually, has 60 minutes to solve the exercise creating a working program. The code should be commented in English.	Skills L S R W Key vocabulary Rendez-vous, synchronization, wait and signal, sleep, deadlock, starvation. Communicative structures What changes would you make to solve ...? What would you select ... ? How would you test ...? To avoid this situation I would ... This part of the code is used to ... This function performs This parameter defines ...	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	• U3_L4_ALL1.pdf U3_L4_ALL1 - Exercises	Developed code and comments
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3	25	Explain a solution to the classmates Justify a strategy. Debate about technical solutions to a problem	Teacher will identify the best solution: the student will briefly explain it to the class. Other students may ask for clarifications, propose different solutions, or ask to justify some implementation choices.	Skills L S R W Key vocabulary Rendez-vous, synchronization, wait and signal, sleep, deadlock, starvation. Communicative structures Why did you choose? I chose to use instead of ... I decided to replace ... with Would it be better if ...? Can you propose an alternative to ...? How would you adapt?	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	---	Students' interactions.
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CLIL Lesson Plan

Unit number	3	Lesson number	5	Title	Final Test
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Activity	Timing	Learning Outcomes	Activity Procedure	Language	Interaction	Materials	Assessment
1	10	--	The teacher introduces the task to be performed, explaining the deliveries, the requests and the evaluation criteria.	Skills	☒ Whole class ☐ Group work ☐ Pair work ☐ Individual work	--	--
				L S R W			
				Key vocabulary --			
				Communicative structures --			
2	95	--	Each student carries out the task assigned (creating a program that solves the proposed problem)	Skills	☐ Whole class ☐ Group work ☐ Pair work ☒ Individual work	• U3_L5_ALL1.pdf Exam: U3_L5_ALL1	Evaluation of developed program and code comments.
				L S R W			
				Key vocabulary --			
				Communicative structures --			