Object Approach to Problem Solving (Playful OOP)

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The aim of the course is to learn the basic programming concepts (branching, variables, inheritance, etc.) of object-oriented programming and to learn how to navigate in the Greenfoot environment. The well-known game Bomberman is used as a demonstration.

Planned ECTS: 4

Number of learners: 5

Mode of delivery: Face to Face

Status: IN PLANNING

Course public access: Private

Contributors:
Michal Varga, Nika Kvaššayová

Course learning outcome	Level	Weight
Understanding the basic principles of object-oriented programming	Understanding	25
The ability of creating own programs with the use of OOP	Creating	20
Understanding the syntax of the Java programming language	Applying	10
Understanding the basics of algorithmisation	Understanding	25
Analysing program execution based on the source code	Analysing	20
	Total weight: 100	

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Mandatory activity	Assessment		
								Points	Type	Providers
Greenfoot environment Understanding the syntax of the Java programming language (**20%)**, The ability of creating own programs with the use of OOP (**80%)**										
The Greenfoot environment										
Creating a new project Bomberman project	20 min	Practice	Onsite	Synchronous	Teacher present	No	No	No	No	No

Total unit workload	0.33h									
Class definition Understanding the basic principles of object-oriented programming (**60%)**, Understanding the syntax of the Java programming language (**20%)**, The ability of creating own programs with the use of OOP (**20%)**										
Object and classes										
Basic concepts Object	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 1.1 Identification of objects and their properties	15 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Basic concepts Class, instance, inheritance	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 1.2 Inheritance of Square and Rectangle classes	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Peer	No	No
Basic concepts Abstract classes	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 1.3 Creating class inheritances	30 min	Production	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Total unit workload	1.41h									
Creating an instance of the world										
Orientation in Greenfoot World, Actor, MyWorld	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Image settings How to choose, create, import, paste an image	10 min	Practice	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 1.4 Creating a tile	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Code observation Class constructor	10 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 1.5 Editing class constructor MyWorld	15 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher, Peer	No	No

Total unit workload	1h												
Creating a player													
Basic concepts subclass, object identity	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No			
Exercise 1.6 Changing player's position	15 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No			
Total unit workload	0.5h												
Object methods													
Basic concepts Method	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No			
Exercise 1.7 Method calling	15 min	Investigation	Onsite	Synchronous	Teacher present	No	No	Teacher, Peer	No	No			
Total unit workload	0.5h												
Revision													
Theory revision object, attributes, methods, instancies	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			
Exercise 1.A - 1.G Attribute properties; Class hierarchy; World creation; Changing the graphical representation; Changing the graphical representation of Player; Calling methods with parameters; World methods	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	35	Summative	Teacher	
Total unit workload	0.75h												

Algorithm

Understanding the basics of algorithmisation (**60%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**20%)**, The ability of creating own programs with the use of OOP (**10%)**

Algorithm, its properties and algorithmisation													
Basic concepts A sequence of steps	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			

Exercise 2.1 Sequence of steps	20 min	Investigation	Onsite	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No
Basic concepts algorithm and its properties	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 2.2 Algorithm creation	25 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Basic concepts algorithmisation	15 min	Discussion	Onsite	Synchronous	Teacher present	No	No	No	No	No
Total unit workload	1.5h									
Creation of a method										
Code explanation Method act()	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 2.3 Exploring methods (Player)	10 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No
Code explanation method move()	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Basic concepts keyword this	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 2.4 Player movement editting	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Peer	No	No
Total unit workload	0.83h									
Writing a documentation										
Basic concepts Documentation comments	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 2.5 Adding comments	5 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 2.6 Adding comments	5 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 2.7 Exploring the documentation window	10 min	Investigation	Onsite	Synchronous	Teacher present	Yes	No	Teacher, Peer	No	No
Total unit workload	0.58h									

Controlling the app from the Greenfoot environment												
Exercise 2.8 Method call	5 min	Investigation	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation autocompleting	5 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Basic concepts Buttons	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Exercise 2.9 Application controls	15 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Method call Greenfoot.delay(time)	10 min	Investigation	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Exercise 2.10 Method for Player movement	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	0.83h											
Revision												
Theory revision algorithm, properties, algorithmisation, buttons	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 2.A - 2.D algorithm, documentation, Player movement	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	20	Summative	Teacher
Total unit workload	0.75h											

Branching

Understanding the basics of algorithmisation (**70%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**10%)**

Incomplete code branching												
Code explanation method turn()	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Basic concepts incomplete branching	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		

Exercise 3.1 Conditional Player movement	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 3.2 Change attributes for movement	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation relational operators	30 min	Acquisition	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 3.3 Player rotation	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.5h									
Complete code branching										
Exercise 3.4 Wall preparation	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Touching the wall	20 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Automated	No	No
Exercises 3.5 - 3.8 Wall obstacles	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Complete branching	15 min	Discussion	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercises 3.9 - 3.11 Complete branching (obstacles and movement)	40 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	2.25h									
Multiple code branching										
Exercises 3.12 - 3.13 Player rotation	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Basic concepts Multiple branching	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 3.14 Image rotation	8 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Exercise 3.15 Movement of multiple Players	7 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Total unit workload	0.75h									

Revision												
Theory revision branching	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 3.A - 3.D branching	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	20	Summative	Teacher
Total unit workload	0.75h											

Variables and expressions

Understanding the basics of algorithmisation (**70%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**10%)**

Variables												
Basic concepts Variables	7 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Total unit workload	0.11h											
Variables identification												
Basic concepts Variable identification	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Total unit workload	0.08h											
Declaration of variables												
Basic concepts Declaration of variables	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Total unit workload	0.16h											
Initialization and assignment of values to variables												
Basic concepts Iinitialization of variables	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Total unit workload	0.08h											
Data types and examples of declaring variables												
Basic concepts Data types	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		

Code explanation data type enum	3 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Total unit workload	0.3h									
Expressions and operators										
Basic concepts Operators	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Code explanation Object expression	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Basic concepts Arithmetic operators and expressions	10 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Basic concepts Boolean operators	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Basic concepts Relational operators	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 4.1 Difference between algorithms	5 min	Investigation	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Basic concepts Boolean expressions	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 4.2 Logical operators and intervals	15 min	Investigation	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 4.3 Adding values and comparing algorithms	5 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Peer	No	No
Total unit workload	1.5h									
Advanced player controls										
Basic concepts constructor, attributes	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Code explanation constructor, attributes	20 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 4.4 Multiplayer control	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No

Total unit workload	0.75h												
Player creation in the world and a reference variable													
Exercise 4.5 Renaming the world	10 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No			
Code explanation Reference variable	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			
Exercise 4.6 Controlling the second player	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No			
Exercise 4.7 Properties assignment problems	15 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No			
Total unit workload	0.83h												
Extension of player features and overloading of constructors													
Basic concepts Constructor overloading	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			
Exercise 4.8 Expanding the player with new attributes	5 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No			
Code explanation Constructor overloading	10 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			
Exercise 4.9 step size	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No			
Exercise 4.10 Adjusting the speed of player movement	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No			
Total unit workload	0.66h												
Revision													
Theory revision Operators	20 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No			
Exercises 4.A Distinguishing players	25 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	5	Summative	Teacher	
Total unit workload	0.75h												

Association

Understanding the basic principles of object-oriented programming (**60%)**, Understanding the basics of algorithmisation (**10%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**10%)**

Ensuring the impassibility of walls

Code explanation Coordinate determination and local variables usage	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 5.1 Changing the Y position	10 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Automated	No	No
Basic concepts Local variables	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Code explanation Return value method	10 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 5.2 Verifying the possibility of movement	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation The use of list of objects - List class	15 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Automated	No	No
Exercise 5.3 Verifying obstacles	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.41h									

Creating of the Bomb class and cooperation with the Player class

Exercise 5.4 Creating Bomb class	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Planting the bomb by the player	5 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 5.5 Planting the bomb	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Timed bomb detonation	15 min	Production	Onsite	Synchronous	Teacher present	No	Yes	No	No	No

Code explanation Limiting the amount of active bombs	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	Teacher, Automated	No	No		
Exercise 5.6 Sound effects	15 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.41h											
Revision												
Theory revision coordinations, local variables, return value method, list	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 5.A - 5.B sound effects, editting code	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	10	Summative	Teacher
Total unit workload	0.91h											
Inheritance Understanding the basic principles of object-oriented programming (**50%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**30%)**												
Inheritance												
Basic concepts Inheritance	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Exercise 6.1 Ancestor and descendant class	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Class hierarchy	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 6.2 Obstacles as a single list	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1h											
Creating a subclass Arena												
Code explanation Ancestor	20 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Basic concepts Ancestor constructor	10 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		

Exercise 6.3 Parametric constructor	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 6.4 Constructor for an empty arena	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	0.91h									
Overriding										
Code explanation Overriding	25 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 6.5 Size representation	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Exercise 6.6 Conditional size representation	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.08h									
Loops Understanding the basics of algorithmisation (**40%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**40%)**										
Layout of the walls in a row (6.4)										
Exercise 6.7 Creating an arena with obstacles	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Basic concepts For loop	25 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercises 6.8 - 6.12 Layout of the walls in a row	45 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.41h									
Formation of a rectangle of walls (6.5)										
Code explanation Creation of a rectangle of walls	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercises 6.13 - 6.16 Creation of a rectangle of walls	35 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	0.83h									

Revision												
Exercises 6.A - 6.D Inheritance and the for loop	45 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	20	Summative	Teacher
Total unit workload	0.75h											
Foreach loop (7.3)												
Exercise 7.8 For loop and detecting damage	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Foreach loop	30 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 7.9 - 7. 11 Hitting player, Remove ownership, List of active bombs	45 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.5h											
Revision												
Exercises 7.A - 7.D Lists and foreach loop	45 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	20	Summative	Teacher
Total unit workload	0.75h											
While loop (8.3)												
Total unit workload	0h											
Lists Understanding the basics of algorithmisation (**30%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**50%)**												
Player evidence in the arena												
Code explanation Player evidence in the arena	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 7.1 Verifying the game ending	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Exercise 7.2 Game ending	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		

Code explanation Game Ending	30 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Basic concepts Containers	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Code explanation Lists	30 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercises 7.3 - 7.6 Lists	45 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	2.58h									
Identification of hit players										
Code explanation Identification of hit players	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 7.7 Bomb and detecting players in the vicinity	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	0.41h									
Encapsulation Understanding the basic principles of object-oriented programming (**50%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**30%)**										
Bomb explosion analysis										
Code explanation Bomb explosion analysis	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Total unit workload	0.25h									
Bomb explosion										
Exercises 8.1 - 8.4 Bomb explosion	75 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.25h									
Private method										
Basic concepts Public and private methods	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Code explanation Private method	20 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 8.6 - 8.10 Private method	60 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.5h											
The reaction of different components to fire												
Code explanation Influence of fire	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 8.11 Checking the fire overlap with the Player	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Exercise 8.12 Chain reaction bombs	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	0.75h											
Revision												
Theory revision Public and private methods	10 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 8.A - 8.C actors	35 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	15	Summative	Teacher
Total unit workload	0.75h											
Polymorphism Understanding the basic principles of object-oriented programming (**50%)**, Understanding the basics of algorithmisation (**10%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**20%)**												
Adding mines												
Basic concepts Polymorphism	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No		
Exercise 9.1 Basic concepts of a mine	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Mine probles	10 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		

Exercise 9.2 Creating the ancestor of the Bomb and Mine classes	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Basic concepts Visibility	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Basic concepts Visibility protected	10 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 9.3 Visibility - protected	5 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Total unit workload	1.58h									
Defining the shared actions of the Bomb and Mine classes										
Code explanation Analysing methods of Bomb and Mine	15 min	Investigation	Onsite	Synchronous	Teacher present	Yes	Yes	No	No	No
Code explanation Methods design	15 min	Practice	Onsite	Synchronous	Teacher present	Yes	Yes	No	No	No
Exercises 9.4 - 9.5 Who are you?; Printing the identification	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Basic concepts Virtual methods	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Exercise 9.6 Printing BOMB	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Polymorphism in the method act()	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercises 9.7 - 9.8 Controlling the explosion at the ancestor; Creating method act	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation Template method	30 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No
Exercise 9.9 Overlapping methods in Bomb	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No
Code explanation keyword super	10 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	No	No	No

Exercises 9.10 - 9.11 Creating methods to explode for the Mine; Enabling Explosives in contact with flames	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	3.33h											
Player reaction to bomb explosion												
Code explanation Player reaction	15 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 9.12 Removing individual lists and creating a shared list	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Removing errors	15 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 9.13 Operator instanceof	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.08h											
Revision												
Theory revision polymorphism	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 9.A - 9.C Timed explosives; Comparing explosives; Creating Dynamite	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	15	Summative	Teacher
Total unit workload	0.75h											
Random numbers Understanding the basics of algorithmisation (**50%)**, Understanding the syntax of the Java programming language (**10%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**30%)**												
Randomising arena layout												
Exercises 10.1 - 10.3 Random number generators	15 min	Investigation	Onsite	Synchronous	Teacher present	Yes	Yes	No	No	No		
Basic concepts Uniform probability distribution	10 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		

Code explanation Actor relocation	10 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 10.4 - 10.6 Constructor for random arena generation; Adding random generation for the arena; Searching free tiles	25 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Wall generation	15 min	Practice	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 10.7 - 10.9 Conditional random generation; Adding attributes to create and search methods; Actor parameter	25 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.66h											
Bonuses												
Basic concepts Bonuses	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercise 10.10 Creating a Bonus class	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Code explanation Greenfoot.getRandomNubmer(100)	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 10.11 - 10.14 Bonuses	45 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher, Automated	No	No		
Total unit workload	1.33h											
Revision												
Theory revision random numbers	5 min	Discussion	Onsite	Synchronous	Teacher present	No	Yes	No	No	No		
Exercises 10.A - 10.D random numbers	40 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	No	20	Summative	Teacher
Total unit workload	0.75h											
Total course workload	**49.5h**											