Ants (Playful OOP)

Ants (Playful OOP)

The aim of the course is to learn the Light OOP concepts using the Greenfoot environment. The game Ants is used as a demonstration.

Planned ECTS: 2

Number of learners: 5

Mode of delivery: Face to Face

Status: NOT STARTED

Course public access: Public

Contributors:
Peter Sedlacek

Course learning outcome	Level	Weight
Understanding the basic principles of object-oriented programming	Understanding	25
Understanding the basics of algorithmisation	Understanding	25
Understanding the syntax of the Java programming language	Applying	10
Analysing program execution based on the source code	Analysing	20
The ability of creating own programs with the use of OOP	Creating	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 Ants project	20 min	Practice	Onsite	Synchronous	Teacher present	No	No	No	No	No
Total unit workload	0.33h									
Class definition, basic work with classes 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 Identification of objects and their properties	20 min	Investigation	Onsite	Synchronous	Teacher present	No	Yes	Teacher	No	No
Basic concepts Class, instance, inheritance	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Total unit workload	0.75h									
Creating an instance of the world										

Orientation in greenfoot World, Actor, MyWorld	10 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Code observation Class constructor	10 min	Discussion	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Prepare world Try to change world graphics, try to set parameters of world etc., instance world	30 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.83h									
Creating a class										
Basic concepts Class, object identity, internal state	25 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 1.2 Create class Wall	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 1.3 Create class Tower	15 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No

Total unit workload	0.83h									
Defining class attributes/fields										
Basic concepts Class properties, working with class state	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 1.4 Define height for wall	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 1.5 Assign value for wall height	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 1.6 Repeat for tower	20 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.91h									
Constructors										
Basic concepts Object creation, constructors	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Task 1.7 Move tower height initialization to constructor	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 1.8 Repeat for Tower	20 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.75h									

Encapsulation, composition, methods

Understanding the basic principles of object-oriented programming (**60%)**, Understanding the basics of algorithmisation (**10%)**, Understanding the syntax of the Java programming language (**10%)**, The ability of creating own programs with the use of OOP (**20%)**

Working with methods

Basic concepts Method	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Identification of methods	15 min	Investigation	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 2.1 Define getHeight method for Wall	15 min	Production	Onsite	Synchronous	Teacher present	No	No	No	No	No
Method parameters	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Task 2.2 Define method with parameter	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 2.3 Repeat for class Tower	30 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	1.58h									
Composition of objects										
Basic concepts Composition of objects	30 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 2.4 Creating of class Player with attributes Wall and Tower	15 min	Production	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 2.5 Creating instance of Wall and Tower in player constructor	15 min	Production	Onsite	Synchronous	Teacher present	No	No	No	No	No
Total unit workload	1h									

Encapsulation										
Basic concepts Encapsulation of methods	30 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 2.6 Encapsulate methods of Wall and Tower	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.83h									

Constructors, more complex method calls (working with graphic in Greenfoot)

Understanding the basic principles of object-oriented programming (**30%)**, Understanding the basics of algorithmisation (**30%)**, Understanding the syntax of the Java programming language (**20%)**, Analysing program execution based on the source code (**10%)**, The ability of creating own programs with the use of OOP (**10%)**

Graphics in Greenfoot										
Basic concepts constants in java	10 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 3.1 defining constants for size of Wall	10 min	Production	Onsite	Synchronous	Teacher present	No	No	No	No	No

Code execution and graphics in Greenfoot	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 3.2 Drawing of wall	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 3.3 Drawing of a Tower	30 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 3.4 Defining another properties of Player	30 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 3.5 Drawing Player	40 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	2.75h									

Branching, conditional execution

Understanding the basic principles of object-oriented programming (**10%)**, Understanding the basics of algorithmisation (**50%)**, 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%)**

Branching

Basic concepts branching	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Task 4.1 Creating object Game	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 4.2 Branching, conditioning execution of code – players drawning to corresponding sides of game plan	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 4.3 Adding instances to world, defining initial draw	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 4.3 Adding instances to world - Wall and Tower	40 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 4.5 Conditioning execution code only one time	25 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	2.33h									

Algorithm, enumerations, arrays

Understanding the basic principles of object-oriented programming (**30%)**, Understanding the basics of algorithmisation (**30%)**, 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%)**

Enums

Basic concepts Enums	20 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 5.1 Implementing card class	30 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 5.2 Defining CardType enum	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	1.16h									

Switch, array

Basic concepts Switch	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 5.3 Drawing of a card	40 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Basic concepts array	15 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Task 5.4 Implementing card array in game	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	1.41h									
Advanced concepts - factory										
Card instantiating	30 min	Discussion	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 5.5 Implementing card factory	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Instantiating of Cards - cloning	30 min	Discussion	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 5.6 Implementing clone method in card and random card instantiating in card factory	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 5.7 Implementing cards in Game, iterating over array	60 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No

Task 5.8 Implementing drawing of a card in Game	40 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	3.5h									

Handling user input, Game logic

Understanding the basic principles of object-oriented programming (**10%)**, Understanding the basics of algorithmisation (**20%)**, Understanding the syntax of the Java programming language (**30%)**, Analysing program execution based on the source code (**30%)**, The ability of creating own programs with the use of OOP (**10%)**

User input

Basic concepts User input - Greenfoot.ask	30 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No
Task 6.1 Input names from user	20 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.83h									

Singletone

Basic concepts Singletone	20 min	Acquisition	Onsite	Synchronous	Teacher present	No	No	No	No	No

Task 6.2 Implementing game as a singletone	10 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	0.5h									
Handle clicking										
Task 6.3 Implementing clicking on a cards	15 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 6.4 Implementing getters of Card and Player	25 min	Practice	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 6.5 Implementing supporting method for Player and fix in World	30 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Task 6.6 Implementing game logic	60 min	Production	Onsite	Synchronous	Teacher present	No	No	Teacher	No	No
Total unit workload	2.16h									
Total course workload	**22.5h**									