

LESSON PREPARATION FORM

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| Lecturer: Widya Prihesti Iswarani | |  | Date: 09-02-2022 |
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| Group: ESSET 2nd year students, groups E & F | Number of students: 16 | | Classroom: HA103 |
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| Subject/lesson: Environmental dynamic modelling: Lotka-Volterra model | | | |

**Starting situation:**

*What do the students already know about the subject and what can they already do? How do they feel about it? Have they already gained work experience?*

*Describe the composition of the group. When and where does the lesson take place? And similar.*

The lesson that I am going to give is Training Environmental Dynamic Modelling, a computer-based practical session using a software called Powersim. Students create models related to environmental problems and use differential equations to build the model.

The students are 2nd year ESSET students. All students have background in differential equations from their calculus class in their 1st year and/or from high school. Most of them already knew the basic of building dynamic model in the software Powersim, some are enthusiastic about modelling but some are less enthusiastic. The group consists of good mix between Dutch and international students with age range between 19–28 years old. We have balanced ratio of girls and boys.

The lesson has mandatory participation (attendance is monitored), and it takes place weekly in a computer room. Some students need to follow the lesson online because of COVIF. In this case, I arrange hybrid lecture and they need to access the software remotely using iavans.nl. The lesson is 2 hours 20 minutes long.

**Objective/lesson objective:**

*Describe the objective(s) of the lesson according to the 3C model, taking account of the taxonomy level according to Bloom.*

1. Students state the suitable operator for different parameters in given dynamic environmental situations in order to be able to work using Powersim software (level 1: remember)

2. Students understand the functioning of the five different Powersim operators including level, flow, constant, auxiliary, and link and is able to use these in order to model dynamic environmental problems (level 2: understanding)

3. Students solve multiple (linked) simple differential equations running Powersim models in order to understand ecological population dynamics and dynamics of the climate system (level 3: applying).

**Educational resources:**  
*Which learning materials do you use during your lesson? (book,  
smartboard, whiteboard, paper, etc.)*

Powerpoint slides provided on Brightspace, YouTube videos, smartboard. Powersim software is available on all desktop Avans computers. By using a remote desktop it is also possible to run the software on a personal (laptop) computer. However, some students with MacBook reported problems with the remote desktop software.

**Assessment procedure:**

*Provide a description of the final assessment of the unit of study and at which of Bloom's taxonomy levels the assessment will be carried out.*

Every week there is a 2 hours 20 minutes class; in which the attendance is compulsory and students are not allowed to miss more than one lecture of the 5 in order to still pass. Besides that, students cannot miss class 4 and 5 to pass the final assignment, because they have to show the progress of their climate model (final model) with the supervising lecturer.

The first three models are to be made in class and will be checked by the lecturer during class (towards the end) and are graded as pass or fail. Models that are not sufficient at the end of the class can be finished after class and will be checked and graded at the beginning of next class. In week 4 and 5, students will work on their final assignment of this course, their individually written report on this model will be the base of their final grade. Products to be handed in include a report in Word format (not pdf) and a file with Powersim simulation model (Powersim Studio 9).



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| **Schedule (how long?)** | **Content (what?)** | **Teaching and learning activities/work forms (how?)** | | **Justify: how will this be used to reach the objective?** |
| **Teacher** | **Student** |
| **Introduction/start:**  **Around 20 mins.** | * Greeting students good morning/afternoon * Explain the structure of the lecture (± 5 mins) * Recap of what we learned and modelled last week(s) ± 15 mins, including questions-answers session | * Check attendance of students * Explain that the structure of the lecture will be as follows: start with recap of what they have learned and done last week  background theory about the model that they need to build today  working session, in which students can also ask questions to the teacher and discuss with each other  closing and conclusion. * Ask students if they still remember what they have learned and done last week by presenting last week’s model. Let the students explain that model. Let students ask questions about last week’s topic and model. Give compliments and feedback to the students. | * Students pay attention to teacher * Students (not everyone, only some representatives) volunteer to give short presentation about last week’s model. Students answer the questions about last week’s topic and model. | * Repeating the materials of the previous weeks will help them to remember again how far the course has progressed and how their fellow classmates are holding up with it, so it will motivate the students. This also corresponds to the first lesson objective, as they must remember what they need to do in order to build the basic of the model. * I also use the activating form, let the students answer my questions “what does this button do in the software?” for example. This will help to achieve the second lesson objective. If the students can answer the questions, it means they understand it. * When students can explain last week’s model, this also shows if they achieve objective number 2. I also want to give compliments, and students can receive feedback from their peers so they feel more encouraged. |
| **Main body:**  **Around 1 h 40 mins.** | * Present the presentation slides, explain background theory about Lotka-Volterra model. * Let students start working on building their Lotka-Volterra model. Teacher walks around to help students. * Include 10-15 mins short coffee/toilet break. Let students take break on their own, because everyone has different progress on their model. | * Teacher gives lecture. Lecture will be given in several parts. Part 1 is building the basic of the model, part 2 is improving the model, and part 3 is finalising the model. I will also explain the relevance of this training in broader aspect of environmental science. * Teacher also give hints about the model. For example, when I explain about the equations that the students need to use in the model, I will ask: “is this an inflow or an outflow?” * Teacher gives students tifme to build their own model. For example, give 20 minutes time for students to build the basic model. If there is a student who is fast and finished the model faster than other students, ask this student to present his result and ask feedback from the other students. I will also give feedback and further explanation. * Walk around to help the students. * Let students discuss and work with the other students sitting close/next to them. | * Listen carefully to the explanation and ask questions if there is anything unclear. Participate actively during the lecture, answer questions from the teacher. Present their work if the teacher asks them to do so. * Work on their model, first try to figure it out themselves and discuss with their peers, and they can also ask the teacher. | * Explaining the background theory about Lotka-Volterra is used to reach Bloom’s taxonomy level 2, and working on the model is used to reach Level 3. * I want to include more active interactions between students (students answering each other’s questions) because I want to promote more active learning. In training classes, normally students just listen passively and do what the teachers ask them to do, and I want to break out from this routine by asking (fast) students to present their results. This is also a form of peer-instruction that I want to experiment with. Students can also give compliments/tips/tops (feedback) to each other. All of these are relevant to achieve objective number 3 (Applying, Bloom’s taxonomy level 3). * Explaining the relevance of the training in broader aspect of environmental science will give students the feeling of relatedness according to Ryan and Deci theory, so they will feel more motivated and determined. |
| **Conclusion:**  **Around 20 min.** | * Wrap-up what was discussed today and show how the final model should look like * Ask students if there are final questions * Remind students to finish the model at home (access the software via iavans.nl) if the cannot finish at class. | * Teacher summarise what has been discussed in the lecture. I want to ask a question/joke “how do you like modelling so far?”. * Teacher let students ask questions. * Teacher checks the final results of students’ model, remind students not to forget to finish the model/continue at home. * Let students fill the feedback form. | * Pay attention and give feedback to teacher if there is still anything unclear. * Show the final results to the teacher. | * Recapping or summarising will help the students to remember again whether what has been discussed matched with what was introduced in the beginning of the lecture, so the students can reflect if the lesson goals/objectives have been achieved or not. * I will let the students fill in the feedback form in the last 10 minutes of the lesson, so they still clearly remember how the lesson was and I can get useful feedback that I can reflect to. |