Curriculum Toolkit
Lesson Plan Template – PHASE II

Lesson Plan Template

Part 1. Lesson Information

A. Lesson Name

Lesson 3: Basic Population Dynamics

B. Lesson Topic(s):

Population ecology, limiting factors and the implications for human society are discussed in this lesson.

C. Lesson/Course Outcomes Map

Create a map for each lesson.

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>LO 1</th>
<th>LO 2</th>
<th>LO 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student will be able to:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Describe Exponential Population Growth, Carrying Capacity and Limiting Factors</td>
<td></td>
<td>1/T/U*</td>
<td></td>
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<tr>
<td>Describe the effects of overpopulation.</td>
<td></td>
<td></td>
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<tr>
<td>Describe Population Cycles.</td>
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<tr>
<td>Conduct and experiment using a model that simulates Population Cycles</td>
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</tbody>
</table>

*I=Introduce/overview; T=Teach in depth; U=Use/Apply/Practice

D. Instructional Resources

List all materials and provide copies of those locally available including:

Required: Resources for writing a scientific paper.

Bates College: http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtoc.html

Colorado State University: http://writing.colostate.edu/guides/guide.cfm?guideid=83

Facilities: Classroom must have enough room to clear a 12 by 12 foot area.

Materials: 5-7 reams of different colored paper, 10-sided die or random number generator, object to be used as a marker in population experiment, masking tape, ruler, yard stick.
Part 2. Lesson Delivery

A. Set-up/Preparation

This lesson will consist of a short Powerpoint presentation followed by an experiment, that uses a game to create a model of population response to an infectious disease. Make sure that you do not start the experiment unless you have at least 70 minutes of time until the end of class.

B. Delivery

Outcome(s)

1. Describe Exponential Population Growth, Carrying Capacity and Limiting Factors
2. Describe the effects of overpopulation.
3. Describe Population Cycles.
4. Conduct and experiment using a model that simulates Population Cycles

Teaching Tips

The Powerpoint is intended to introduce students to the basics of population dynamics. It should be delivered relatively quickly, but you should ask question, or use think-pair-share activities in order to ensure students understand the concept.

Population Activity:

This activity works best when it is run as a competitive game, with the winning team being the one that has the most papers in the arena when the game is ended. Teams will develop strategies to win that will add interesting complexity to the experiment, but will not affect whether or not populations. After the game/experiment concludes you will be able to talk about concepts like genetic drift, edge effects, how spatial networks affected the spread of disease.

That said some rules are necessary in order to ensure the game is fair and the experiment is effective. These rules should be enforced as necessary.

1. When an organism(paper) is added to the arena it must be a full sheet of paper and should be crumpled into a ball.
2. Organisms cannot be moved after they are placed.
3. If an organism is thrown into the arena and rolls out it has fallen off a cliff and died.
4. Remind students regularly to keep good notes and to ask for help if they need it.

When the experiment is completed, prepare a spreadsheet and have the students enter the starting population for each round in their team’s column. When they have done so, do a sum of the total population in each round in a final column. (This spreadsheet should be shared with students after it is completed) When the total population over time is graphed it should look something like the graph below.
A graph of the individual team populations will look something like this.

While looking at the graphs you should talk about how well they answer the question of whether disease can cause population cycles and then talk about whether or not other information can be gleaned from the students. I typically only ask students to analyze the data from the population at the beginning of each round in order to simplify interpretation of the results.

The scientific paper associated with this experiment will be difficult for students to complete, so it may be useful to require students to hand in drafts before handing in the final paper. I typically allow students at least 3 weeks to complete this assignment and require drafts each of the sections to be handed in separately. I grade these as a class activity and have students comment on each other’s work and ask questions rather than reading all of them.
myself. This reinforces the importance of editing and assures that the students will get comments on their work quickly.

**Learning Activities – Sources of Assessment Evidence**
Describe the specific content, modes of instruction, and related source of assessment evidence.

*Lecture:* Powerpoint slides with notes provided.

*In-class exercise:* Description provided above, hand-outs and rubric provided in folder.

### Part 3. Evaluation

#### A. Assessment

- **Population Activity:** Absent or not participating=F, Present and participating=A

- **Scientific Paper:** (See rubric) <60=F, 60-69=D, 70-79=C, 80-89=B, >89=A

- **Lesson 3 Quiz:** (See key) <60=F, 60-69=D, 70-79=C, 80-89=B, >89=A

#### B. Course Log

This critical step will help prepare your course materials for use by others. Takeing the time to document the accomplishment of learning outcomes, identify *sticking points*, and write coaching notes as you teach the course

- **Evidence of learning** (Summarize the extent that the lesson outcome(s) were achieved by the group based on the assessment evidence.)

- **Sticking Points** (Identify the topics that were difficult for students to grasp based on informal observations and formal assessments.)

- **Coaching Notes** (Suggest strategies to address the difficulties identified and other lessons learned from teaching this unit.)