

WEBINAR SERIES

Remote Learning: Findings from a Crisis Period

Reimagining a Field Course for Virtual Delivery

Presented by:

Dawn R. Bazely

University Professor, Dept. of Biology
Faculty of Science, York University

Teach a Virtual Field Course? 🤖

How we did #ScienceFromHome with #KitchenSinkEcology



Dr. Dawn Bazely
@dawnbazely on Twitter
@drbazely on Insta

For JoVE Webinars
Remote Learning: Findings from a Crisis Period
October 20, 2020

🙏 With huge support from
Alex, Spandan & Olga at JoVE



From IRL to online

- My In-Real-Life June 2020 field course was cancelled in March 2020 due to the Covid-19 pandemic
- I'm sharing my basic recipe for making a field course virtual, including designing affordable student science-at-home-course kits
- It can be extended to all science labs with:
 - A. Some guiding principles for taking a (field) course online
 - B. The basic approach and method
- Applying this thinking to a Halloween Trick or Treat Kit for friends' children  

IRL Biodiversity & Watershed Management 2020 was cancelled in March



Faculty of Science, York University
Annual Review 2018:

<https://www.yorku.ca/science/wp-content/uploads/sites/31/2020/07/Faculty-of-Science-2018-Annual-Review.pdf>

Virtual Biodiversity & Watershed Management ran Summer 1 Term May-June 2020



yes, that's my model watershed made of recycling bin contents





At the beginning of April, I brainstormed how to transform a two-week field course that ran daily from 8:30 am to 5 pm, from Monday to Friday, to an online course that was not a duplicate of the field course experience, but which replicated many of those experiences as authentically as possible, and substituted equivalent learning

My main approach was to imagine parallel pandemic-public-health-policy compliant at home activities and to design and mail out an inexpensive kit — \$20 CAD for the boxed contents — to 26 students. Please note that field courses usually have a maximum of 16 to 20 students and this virtual course could accommodate 10 more students than the 16 original, in-real-life spaces.

My department chair, Prof. Rob Tsushima and the Undergrad Programme Director, Prof. Paula Wilson were very supportive, as was the Teaching Technician Team.

From IRL to online

- My In-Real-Life June 2020 field course was cancelled in March 2020
- My basic recipe for designing a virtual field course & developing affordable student science-at-home-course kits:
 - Some guiding principles for taking a (field) course online
 - The basic approach and methods
- Applying this thinking to a Halloween Trick or Treat Kit  

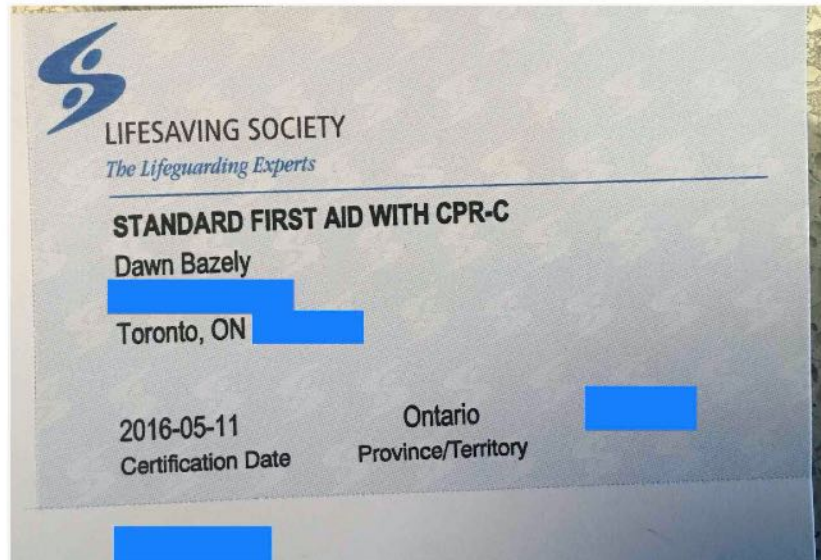
From IRL to online: Basic approach & methods

1. Some guiding principles for taking a (field) course online

- research the history of your field of science
- reflect on your own journey as a scientist: what did you really enjoy?
- ask: what are my course teaching goals and outcomes?

2. The steps

- set up your at-home workspace
- mind map the course, research notes, cost out your at-home student lab kit
- figure out what works at home — test it yourself
- get help from your colleagues for virtual labs and lectures
- and anywhere and everywhere else — and credit your sources (very important for building trust)



1) A crisis isn't the time to learn new skills

You will discover your pandemic-safe, virtual approach when you look back at science history and your own science journey

Every university and college course director can create your own virtual labs and an inexpensive at-home lab kit, but it does take quite a lot of creative energy and time.

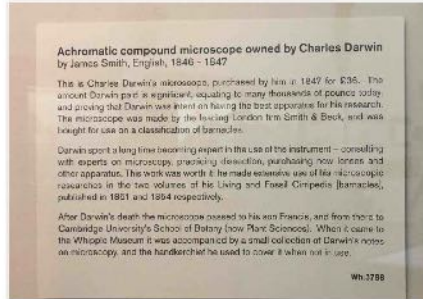
Therefore, rather than everyone reinventing the wheel, my aim is to help and support you, by doing some of the heavy lifting with this basic recipe.

Plus, a crisis isn't the time to learn new skills.

I am always inspired by Google Scholar's Standing on the Shoulders of Giants slogan

2) Technology is just a Tool

Whipple Museum of
the History of Science
University of
Cambridge



If it's not working or available go back to basics and ask "what is the point?"

Today, science in the Global North is done today high tech equipment, but that was not always the case, especially with field research. We teach students that "real science" needs lots of sophisticated gizmos. They help, but critical thinking about science is the driving force. You will find your pandemic safe, virtual approach when you look back

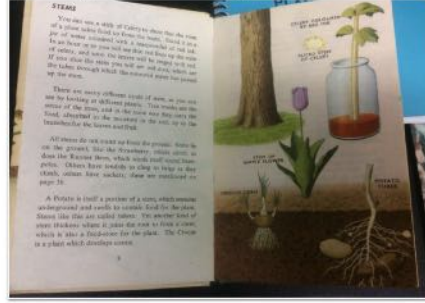
at history and your own journey in science
Understanding low and high tech:

[https://dawnbazely.lab.yorku.ca/2018/02/
digital-divide-chronicles-part-2/](https://dawnbazely.lab.yorku.ca/2018/02/digital-divide-chronicles-part-2/)

Photos of Darwin's microscope from
Whipple Museum of the History of
Science, University of Cambridge:

<https://www.whipplemuseum.cam.ac.uk/>

3) Remember your own journey to STEM



What inspired YOUR interest in science?

You will find your pandemic safe, virtual approach when you look back at history and your own journey in science

The Ladybird Book, Plants & How They Grow (1965) inspired my interest in botany and plant ecology:

<https://www.abebooks.com/book-search/title/plants-and-how-they-grow-a-ladybird-natural-history->

[book/author/newing-f-e-and-bowood-richard/](#)


I used these ideas in my Plant Biology lab and for a 2016 Advent Botany Post for the University of Reading.

My How to Create a Candy Cane

Chrysanthemum Advent Botany Post:

<https://blogs.reading.ac.uk/crg/adventbotany-2016-how-do-you-create-a-candy-cane-chrysanthemum/>

4) Review course learning outcomes



Biodiversity & Watershed Management / Advanced Field Studies in Physical Geography

Exclusively for YorkU Geography, Biology & Environmental Science students

8-12 June 2020 & 15-19 June 2020
7:00 am-6 pm
Monday-Friday
Lumbers labs & Kortright Cons. Area
Prof. Dawn Bazely

jobs for 2 weeks straight, due to weekend work commitments.

In week 1, students are introduced to field work, including how to identify, and monitor plant and animal diversity in different urban, and rural habitats. We are based in the green building of the Archetype House at Kortright.

In week 2, we form student teams, who carry out a 5-day research project developed in consultation with Science Teaching award-winner Dr. Bazely.

We also learn about careers in physical geography, ecology, and environmental science.

Additional course fees are \$350 for van

Our days are a combination of field, lab and classes. At the end of the course, you will:

1. Understand watershed function and biophysical monitoring theory.
2. Know how to use relevant field and lab equipment.
3. Design and carry out a research project, including analyzing and interpreting data.
4. Get hands-on fieldwork experience.

Read the 2016 course blog here: www.watershedbiodiversity.wordpress.com

From IRL to online: Basic approach & methods

1. Some guiding principles for taking a (field) course online
 - research the history of your field of science
 - reflect on your own journey as a scientist: what did you really enjoy?
 - ask: what are my course teaching goals and outcomes?
2. The steps
 - set up your at-home workspace
 - mind map the course, research notes, cost out a kit
 - figure out what works at home
 - get help from your colleagues for virtual labs and lectures
 - and anywhere and everywhere else — and credit your sources

5) Set up your Home Workspace



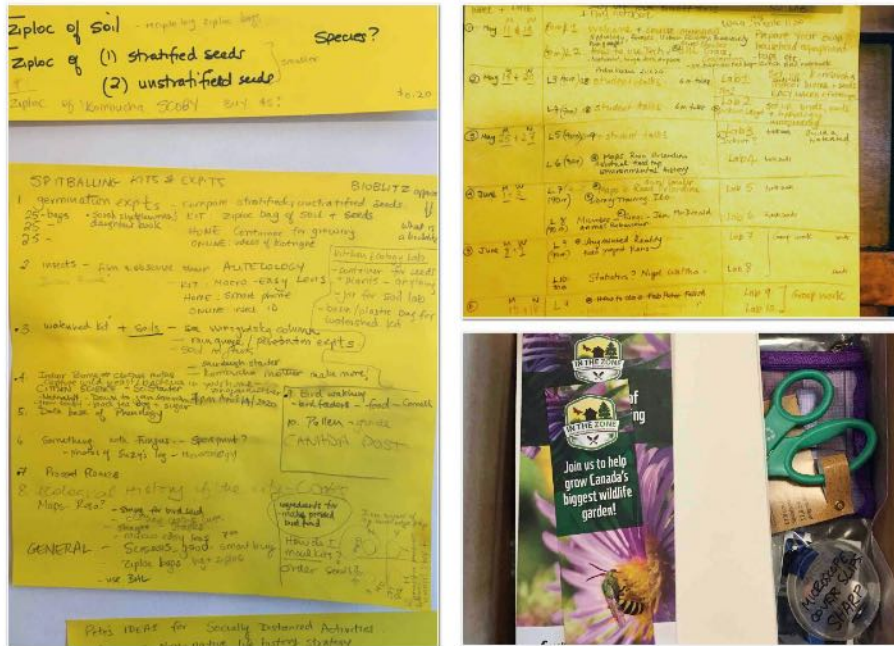
I moved within my home four times after the pandemic lockdown was announced in March: my husband was working from home & my adult children moved home and needed space for meetings. Plus we had an international visiting grad student to my lab in our basement apartment — she could not move onto campus when Winter Term ended because it

was closed to most people.

I ended up in the front sitting room. we
moved out an easy chair and brought in
my desk

remember that students are probably
working under as cramped or more
cramped conditions

6) Mind map your ideas



I did lots of online and offline research
 I proposed and designed a kit as
 essential to delivering a hands-on,
 field course experience

7) Frugal Innovation keeps costs low

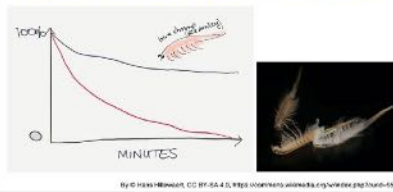


Approaching Research with a Frugal Innovation Mindset

Professors Dawn Bazely (York) & Shibani Chaudhury (Visva Bharati)

We developed a frugal but effective bioassay to test toxicity

- <https://twitter.com/Shibanivb/status/793820027187236864>



If it's not working or available go back to basics and ask "what are we doing?"

To reiterate: a crisis isn't the time to learn new stuff.

I was familiar with Frugal Innovation, having collaborated on this approach with colleague, Prof. Shibani Chaudhury

I have had access to millions of research dollars over my forty years of research (30 as a professor), but innovation is borne, more often, than

not, out of constraint

Prof. Manu Prakash's Ted Talk:

https://www.ted.com/talks/manu_prakash_a_50_cent_microscope_that_folds_like_origami?language=en

<https://www.foldscope.com/>

7) Frugal Innovation to Reduce Cost



Soapbox Science brings high tech research to the streets with home-made props!

We featured our Frugal Innovation research at Soapbox Science

All the speakers had very cool home-made aids to explain very high tech research in plain language. Here are Sasha Welditch and Dr. Nadia Octave at the first North American Soapbox Science event, organized and hosted by Ryerson University, when my colleague, Prof. Imogen Coe was the

founding Dean of Science

<http://soapboxscience.org/>



8) What works at home?

I learned about Winogradsky columns on twitter, from microbiologist, Dr. Justine Dees, [@justineldees](https://twitter.com/justineldees).
Which led me to the JoVE video that students used.

What would students have at home?

-The most expensive item in the Field Course Kit was a pair of dedicated scissors!

I built in redundancy for the digital divide, wifi outages.

-This reduced student anxiety.

Shipping the kits with Canada Post tracking numbers hugely relieved my stress

Remember the Rivet Popper Hypothesis about redundancy in Paul R. Ehrlich, Anne H. Ehrlich 1981: Extinction: The Causes and Consequences of the Disappearance of Species (great book)

Biodiversity and Watershed Management Remote Field Course
Department of Biology, York University

**Packing List for Your Field Kit – with Pictures –
to do Science at Home & Kitchen Sink Ecology**

By
co-opted Course Technician:
YorkU Biology undergrad student, Ms. Carrie
Ewins,
and Prof. Dawn Bazely

Document date: 8-05-2020



Large Ziploc bag of assorted seeds of five plant species: common milkweed (*Asclepias syriaca*), yellow plantain (*Ligusticlin byssinosa*), flowering onion (*Allium tripedunculatum*), purple scorpion (*Sarracenia purpurea*), and a small piece of *Scabiosa* stem.
Question: Which of these are native/indigenous species? Which are introduced/exotic species? Question: What does the term stratification mean when applied to seeds?



Small Ziploc bag of live SCOBY in Kombucha starter



Small Ziploc bag of miscellaneous seeds (5 species: common milkweed, Great yellow fescue, flowering onion, heartleaf fish eye, flowering star), sugar packets, a toothpick, and a small piece of *Scabiosa* stem.
Question: What does the acronym SCUBA stand for?
Question: What is an oecozyme?



Zippered pouch containing Foldscope kit components, LED magnifier, spare batteries, and microscope slides

What was in the kit?



Easy Macro lens



1 metre piece of string



Pair of scissors so that you don't have to use your family kitchen scissors



Sharpie marker, pencils, and stir sticks for marking your seeds when you plant them



WWF-Canadiana Canada's In the Zone Gardening pamphlet and bookmark. You can register your garden or balcony at the In The Zone Website if you plant your native plant seedlings outside after they germinate and grow in our experiments.



Small Ziploc bag of bird seed: recipe to make a hanging bird feeder ornament to hang outside will follow on Moodle.

What was in the kit?

those scissors were appreciated!

9) Ask for help!



I asked my husband, Dr. Pete Ewins, who was WWF Canada's Senior Species Specialist until the end of June 2020 to help, former TA of the field course, Dr. Scott Tarof and Ms. Grace Costantino, the Outreach Manager of the Open Access Consortium, the Biodiversity Heritage Library and other colleagues, to help me by giving online talks and lab

exercise supports.

The virtual field course e-class

General

Week 1 May 11, 2020: Meet & Mingle Lectures, Make Your Foldsopes & Winogradsky Columns

Week 2 May 18, 2020: Victoria Day: Wednesday Zoom guests Mr. Jackson Langat (Soil Science) & Dr. Jen McDonald (Fungi & the Indoor Biome)

Week 3 May 25, 2020: Urban Ecology Lectures & Maps with Librarian Rosa Orlandini

Week 4 June 1, 2020: Pecha Kucha student talks. Sharpen your online research skills with TWO Librarian Zoom guests. Observing Urban Wildlife with Dr. Scott Tarof

Week 5 June 8, 2020: Designing Your Group Project with stats advice from Zoom guest Prof Nigel Walther

Week 6 June 15, 2020: Designing Your Group Project with stats advice from Zoom guest Prof Nigel Walther

How is a Field Course Different from a regular Biology course?

Field courses are intensive learning experiences. Many are residential, held at a field station. Others are non-residential, with students working 8 am to 5 pm Monday to Friday over two weeks (plus assignments).

- Students learn how to collect ecological field data.
- Students learn how to design and carry out a research project running over a week.
- Students practice how to negotiate and navigate group work.
- Students learn natural history and how to identify fauna and flora species.

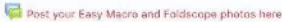
During this pandemic, we will be doing activities that are not identical but which have the same spirit as an in-person field course!

Read (yes, that means read, using the links to the archives on this standard webpage to get to the first post from 2014) what students in previous Biodiversity and Watershed Management courses wrote here:

<https://watershedbiodiversity.wordpress.com/>

Preparing for our Remotely Taught Field Course:

- Dust off all your biology text books from other courses: you will need them. Read over them to re-acquaint yourself with their main chapters. YES, open that text book. OR go through YorkU library and find an e-book version.
- Get yourself an empty notebook and prepare to make notes and drawings of flora and fauna in your Indoor Biome.
- Prepare to act on what's in your Science At Home kit which is being mailed out today, as soon as you receive it.
- The videos and information will be posted in the Moodle Module: What's in the Box?



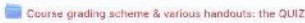
Labs start this Wednesday of Week 2.

Please post your experimental photos with your Easy Macro Lenses and Foldsopes here.

Click on this link for an astonishing set of images of five plants done with SEM in an open access paper in Figshare.

Our gear isn't that high resolution, but we can get some cool pix, too. Like my pic of a Bloodroot (that's a native plant species) flower, at left with the Easy Macro Lens.

Also, please share your comments and experiences with setting up the Foldscope and trying out the Kitchen Sink Ecology Science From Home field kit gear.



25% - Talk in Pecha Kucha Format -- Prof Bazely **HAS** assigned everyone a paper to present

10% - In-moodle quiz about identification of flora and fauna around week 4 **THE QUIZ IS HERE -- please make sure to do the UPDATED quiz (due July 12, 2020) in both document format and the Google survey format:**

The virtual field course e-class

SC/BIO13001 B - Field Course (Summer 2019-2020)	
Participants	
Rariges	
Competencies	
Grades	
General	
Week 1 May 11, 2020: Meet & Mingle Lectures, Make Your Foldscopes & Winogradsky Columns	Topic 1
Week 2 May 18, 2020: Victoria Day. Wednesday Zoom guests Mr. Jackson Langat (Soil Science) & Dr. Jen McDonald (Fungi & the Indoor Biome)	Topic 2
Week 3 May 25, 2020: Urban Ecology Lectures & Maps with Librarian Rosa Orlandini	Topic 3
Week 4 June 1, 2020: Pecha Kucha student talks. Sharpen your online research skills with TWO Librarian Zoom guests. Observing Urban Wildlife with Dr. Scott Tarof	Topic 4
Week 5 June 8, 2020: Designing Your Group Project with stats advice from Zoom guest Prof Nigel Waltho	Topic 5
Week 6 June 15, 2020: Group Project Work. Designing a better science poster with Zoom guest, Dr. Fallon Tanentzap of Cambridge University, UK	Topic 6
Week 7 June 22, 2020: Quiz is here, plus Share your Group Projects & Get Feedback on Finishing Them & Making your Posters	Topic 7
Careers in Biodiversity & Watershed Management: your Zoom guests speak	Topic 8
Field Notebooks often recount stories of Fieldwork Fails!	Topic 9
Watershed Ecology & Urban Ecosystems	Topic 10
Soil Ecology	Topic 11
Learn about Maps with Librarian Rosa Orlandini	Topic 12
Seed Ecology	Topic 13
Pollen Ecology	Topic 14

The virtual field course e-class

<p>☐ Week 4 June 1, 2020: Pecha Kucha student talks. Sharpen your online research skills with TWO Librarian Zoom guests. Observing Urban Wildlife with Dr. Scott Tarof</p>	<p>▶ Week 3 May 25, 2020: Urban Ecology Lectures & Maps with Librarian Rosa Orlandini</p>	<p>Topic 3</p>
<p>☐ Week 5 June 8, 2020: Designing Your Group Project with stats advice from Zoom guest Prof Nigel Waltho</p>	<p>▶ Week 4 June 1, 2020: Pecha Kucha student talks. Sharpen your online research skills with TWO Librarian Zoom guests. Observing Urban Wildlife with Dr. Scott Tarof</p>	<p>Topic 4</p>
<p>☐ Week 6 June 15, 2020: Group Project Work. Designing a better science poster with Zoom guest, Dr. Fallon Tanentzap of Cambridge University, UK</p>	<p>▶ Week 5 June 8, 2020: Designing Your Group Project with stats advice from Zoom guest Prof Nigel Waltho</p>	<p>Topic 5</p>
<p>☐ Week 7 June 22, 2020: Quiz is here, plus Share your Group Projects & Get Feedback on Finishing Them & Making your Posters</p>	<p>▶ Week 6 June 15, 2020: Group Project Work. Designing a better science poster with Zoom guest, Dr. Fallon Tanentzap of Cambridge University, UK</p>	<p>Topic 6</p>
<p>☐ Careers in Biodiversity & Watershed Management: your Zoom guests speak</p>	<p>▶ Week 7 June 22, 2020: Quiz is here, plus Share your Group Projects & Get Feedback on Finishing Them & Making your Posters</p>	<p>Topic 7</p>
<p>☐ Field Notebooks often recount stories</p>	<p>▶ Careers in Biodiversity & Watershed Management: your Zoom guests speak</p>	<p>Topic 8</p>
	<p>▶ Field Notebooks often recount stories of Fieldwork Fails!</p>	<p>Topic 9</p>
	<p>▶ Watershed Ecology & Urban Ecosystems</p>	<p>Topic 10</p>
	<p>▶ Soil Ecology</p>	<p>Topic 11</p>
	<p>▶ Learn about Maps with Librarian Rosa Orlandini</p>	<p>Topic 12</p>
	<p>▶ Seed Ecology</p>	<p>Topic 13</p>
	<p>▶ Pollen Ecology</p>	<p>Topic 14</p>
	<p>▶ The Indoor Biome</p>	<p>Topic 15</p>
	<p>▶ Virtual Field Trips with Augmented Reality</p>	<p>Topic 16</p>
	<p>▶ What to do with your bird seed: Animal Behaviour</p>	<p>Topic 17</p>
	<p>▶ Team Science, Citizen Science and Science Communication</p>	<p>Topic 18</p>

I made iPhone instructional videos

- they were easy to film
- BUT making them small enough files for students to watch without eating up wifi data was time-consuming work
- I stopped at 2 sets!
- The students kit contained bags of dry potting soil from the YorkU greenhouse
- here, my husband explains seed-planting:
- <https://vimeo.com/423763404>
- <https://vimeo.com/423763733>
- <https://vimeo.com/423764862>
- ps I was thrilled to have the JoVE Winogradsky video





10) Hallowe'en Uncertainty

I designed a Trick or Treat Kit for young neighbours & friends & colleagues' children

I used paper, inexpensive candy, markers and wool scraps — each box cost about \$5 plus time

Double-sided tape was really useful



Questions?

Thank you to Alex Winzenread,
Spandan Sharma and Olga Karanikos
from Jove for allowing me to share my
pedagogical work and teaching.

Time for questions!

- 1) A crisis isn't the time to learn new skills
- 2) Remember: Technology is just a Tool
- 3) Remember your own journey to STEM
- 4) Review course learning outcomes
- 5) Set up your Home Workspace
- 6) Mind map your ideas
- 7) Frugal Innovation to Reduce Cost
- 8) Figure out what works at home
- 9) Ask for help!
- 10) My approach applied to a Hallowe'en Kit for Kids to Trick or Treat at Home

bit.ly/remotelearningwebinars