Designing a Hybrid Science Lab Course: General Chemistry I

Aisling M. O'Connor

5th September, 2017

It’s a Changing World!

Early Interest in Distance Education!

http://www.yvonneclaireadams.com/HostedStuff/SchoolOfTheAir7.jpg

How I Got Started!

- 2006: International marketing on-line
- 2012: Designing, development and teaching of on-line chemistry courses
- 2014: Distance learning & hybrid teaching mini-workshop

General Chemistry I

- Introductory course for science majors
- Taken by many EXSS students & those interested in careers in the health sciences
- 2 lectures (1 hr. 15 min.) & 1 lab (2 hr. 45 min.) per week
- Challenging course for students with weak math skills
- Offered every semester and in Summer I
- Summer I students are generally strong & motivated

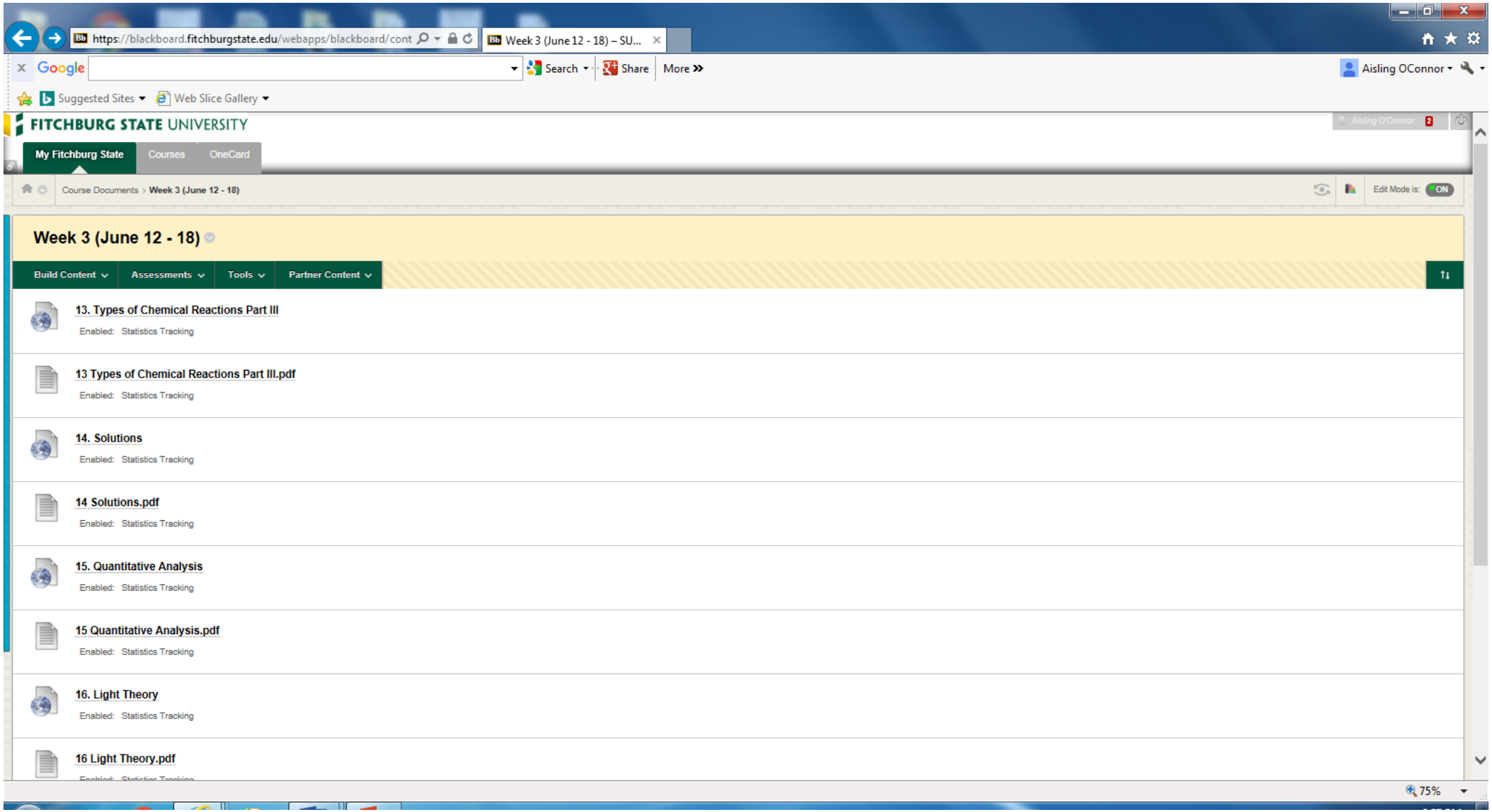
General Chemistry I Hybrid Lab Course

- Lecture portion of course all on-line
- All lectures recording using Tech Smith Relay
- Tablet used to annotate PowerPoint slides and solve problems
- Class meets 3 hours per week / 9 hours per week in Summer I (15 sessions)
  - Orientation & safety training
  - 10 experiments
  - 4 – 5 problem sheets
  - 2 review sessions
  - 3 exams
- Sapling on-line homework
- Taught as a Summer I course & GCE spring night course

Schedule for Typical Week (Summer I)

Sessions	Lecture Recordings	Face-to-Face Meetings	Reading	Homework
Week 3: June 12 - 18 **Class Meetings:** Tues., June 13 Thurs., June 15 Fri., June 16	13. Types of Chemical Reactions Part III 14. Solutions 15. Quantitative analysis 16. Light Theory 17. Quantum Mechanics & Numbers 18. Electron Configuration	**Tuesday, June 13:** Mid-term exam review session Problem Worksheet 3 **Thursday, June 15:** ***Mid Term Exam, 9:30 – 11:30 am*** **Friday, June 16:** *Experiment 6: Analysis of Vinegar*	Chapter 4 (4.9) Chapter 4 (4.4) Chapter 7 Chapter 8 (8.1 – 8.4)	Sapling On-line Homework 5, due June 14 @ 11:30 pm Sapling On-line Homework 6, due June 18 @ 11:30 pm

Blackboard Site



Example Lecture

- Lecture 14: Solutions
- http://www.screencast.com/t/cFlyfLfCDzXq

Preparing Solutions By Dilution Example

A stock solution of NaCl is 6.00 *M*. How much of this stock solution is needed to prepare 1.00-L of physiological saline solution (0.154 *M*)?

$M_c V_c = M_d V_d$

$V_c = \frac{M_d V_d}{M_c} = \frac{(0.154\,M)(1.00\,L)}{6.00\,M}$

$V_c = 0.0257\,L$

$0.0257\,L \times \frac{1000\,mL}{1\,L} = 25.7\,mL$

Due Dates / Calendar

Due Date / Reminder Calendar, May / June 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30 Class First class meeting	31 H/W 1 due @ 11:30 pm	1 Class Pre- lab Q. Exp. 1 due	2 Class Pre- lab Q. Exp. 2 & Lab Report Exp. 1 due	3
4 H/W 2 due @ 11:30 pm	5	6 Class Pre- lab Q. Exp. 3 & Lab Report Exp. 2 due	7 H/W 3 due @ 11:30 pm	8 Class Pre- lab Q. Exp. 4 & Lab Report Exp. 3 due ***Early Term Exam***	9 Class Pre- lab Q. Exp. 5 & Lab Report Exp. 4 due	10
11 H/W 4 due @ 11:30 pm	12	13 Class Lab Report Exp. 5 due	14 H/W 5 due @ 11:30 pm	15 Class ***Mid-Term Exam***	16 Class Pre- lab Q. Exp. 6	17
18 H/W 6 due @ 11:30 pm	19	20 Class Pre- lab Q. Exp. 7 & Lab Report Exp. 6 due	21 H/W 7 due @ 11:30 pm	22 Class Pre- lab Q. Exp. 8 & Lab Report Exp. 7 due	23 Class Pre- lab Q. Exp. 9 & Lab Report Exp. 8 due	24 ***Take Home Exam Due @ 11:30 pm***
25 H/W 8 due @ 11:30 pm	26	27 Class Pre- lab Q. Exp. 10 & Lab Report Exp. 9 due	28 H/W 9 due @ 11:30 pm	29 Class Lab Report Exp. 10 due	30 Class Last class meeting ***Final Exam***	1

Pros / Cons

- Students spend less time on campus
- Increased flexibility
- Still have face-to-face access to professor
- Interact with peers in lab
- More in-class time for problem solving and review
- On-campus exams (2 – 3 hours)
- Recorded lectures can be posted for traditional Gen. Chem. I course

- Students not taking the time to view / study lecture material
- Cannot ask questions during lecture
- Weaker students may struggle more
- Spring GCE courses not as successful as Summer I courses

Lessons Learned /Plans for the Future

- Constant reminders regarding due dates and keeping up with lecture material are necessary
- Due date / reminder calendar has worked very well
- Lecture recoding are too long!
- Need a method to ensure students are viewing / studying lectures
- Re-record lectures; split up from 24 to approx. 50
- Short Blackboard quiz to be completed after each lecture
- Hybrid Forensic Chemistry class (non-lab)?
- Help others develop hybrid science lab courses

Acknowledgements

- Dr. Mike Leamy
- Dr. Meg Hoey & Dr. Mel Govindan