

## Coursera's Systems Biology and Biotechnology Specialization - My initial impressions

Couple years ago, Coursera started offering a series of courses in [Systems Biology](#) developed by the Icahn School of Medicine at Mount Sinai in New York. The series includes 5 lecture style courses possibly recorded in 2013/2014 (as per the slides) and a final capstone course. At the time of this writing, Coursera was charging \$39/month for this specialization and providing a 7-day trial period. In this series of posts, I will share my experience on this specialization.

As a computer scientist with formal training in Bioimaging, I work in the life sciences field where I support drug discovery scientists. Systems Biology and Bioinformatics are large areas for research at my work place. However, I do not have formal biology training beyond a synthetic biology and two introductory neuroscience courses that I took during my postdoc. Thus, I needed to gain some knowledge to be able to understand what was happening around me. Coursera has another similar [specialization in bioinformatics](#), however I found the systems biology specialization to be more suitable for my interests and learning goals. The bioinformatics specialization is a series of 7 courses and it is geared more towards transforming you into a bioinformatics software professional; I am still interested in trying that one out--maybe at a later date.

I decided to take a stab at this specialization during 2017 holiday season. It is recommended to start from the Introduction to Systems Biology course and the capstone is the last course. It is recommended to complete the Integrated Analysis in Systems Biology course right before the capstone as it will prepare you for the capstone project. The remaining courses can be taken in any order although Coursera recommends the following sequence:

- Introduction to Systems Biology
- Experimental Methods in Systems Biology
- Network Analysis in Systems Biology
- Dynamical Modeling Methods for Systems Biology
- Integrated Analysis in Systems Biology
- Capstone

The courses run for couple sessions a year and the assignments have certain deadlines that you might want to watch for in order to keep yourself on track. However, they are on-demand and it is possible to work through the courses before their start dates as long as you submit the assignments before the session ends. You can take the courses in a sequence or try multiple ones concurrently. At the time of this writing, Introduction to Systems Biology officially starts on January 8th 2018 while Experimental Methods in Systems Biology already started on December 25th 2017 with a week 1 deadline of January 1st. Network Analysis course starts on January 1st 2018, and the remaining two courses start on January 8th 2018.

*I choose to work on some courses concurrently. First I completed the first 3 weeks of the introduction course, then switched to the experimental methods course and completed week 1. After that, I worked through first weeks of the network analysis and dynamical modeling courses*

*to form an opinion on what is to come.*

The specialization is tough, it is listed as intermediate level on Coursera. Judging by the discussion boards, it seems like these courses were popular on Coursera 2-3 years ago. *There has not been too much activity recently and I have noticed that the course staff did not interact with the students at all on the discussion boards.*

Weekly quiz questions are difficult and require some thinking and online research. Don't be surprised if you need to take them multiple times to get a good grade. Moreover, the quiz evaluations only tell you if you answered correctly or not without any further explanation. This specialization requires certain familiarity to cell biology and mathematical tools such as ODEs/PDEs and also statistics. Knowledge of Matlab is recommended as some assignments will be in Matlab. The instructors provide a brief introduction and free license to Matlab. I am quite familiar with the math and statistics, although the biology was a bit challenging as it requires more of memorizing things. I found the following resources useful. If you like animated videos, Youtube has lots of good resources.

### Resources:

[Molecular Cell Biology, 4th edition](#): Free access from NIH site

[Molecular Biology of the cell, 4th edition](#): Free access from NIH site

[Systems Biology Textbook, 2016](#): Seems like this is the most up-to-date textbook in print as of 2017. Kindle edition might have some issues with figure quality. Paperback version costs around \$80.

In summary, even though the material might be 4-5 years old, this was the the only general training opportunity in systems biology that I was able to find on the internet and it is provided by a top institution in this field. This specialization is certainly not for everyone but if you stick to it, you will certainly learn a lot. Finally, I would like to thank the Icahn School of Medicine at Mount Sinai in New York and Coursera for this training opportunity.

Update as of October 1st 2018:

***At this time, sadly I am done with only approximately one thirds of the specialization as life happened*** ;-( I intend to release a series of posts to review individual courses if I ever get around to finishing them ;-(