Lesson Plan for One Hour Undergraduate Discussion Session on Noninvasive Prenatal Diagnostics using Next Generation Sequencing.

Goals:

- Introduce undergraduate students to concept of noninvasive prenatal genetic testing using next generation sequencing.
- Provide students with ability to evaluate evidence for the technology underlying new genetic testing methods.
- Provide students with the background to interpret results of a diagnostic test for trisomy 21.

Before class:

- Distribute the following paper: Ehrich, Mathias, et al. "Noninvasive detection of fetal trisomy 21 by sequencing of DNA in maternal blood: a study in a clinical setting." *American Journal of Obstetrics and Gynecology* **204**:205.e1-11.
- Have students visit the following NHS websites:
    - http://www.nhs.uk/Conditions/Downs-syndrome/Pages/Causes.aspx
    - http://www.nhs.uk/conditions/pregnancy-and-baby/pages/screening-amniocentesis-downs-syndrome.aspx
- Have students watch the following YouTube video:
    - https://www.youtube.com/watch?v=l99aKKHcxC4

Questions for discussion during class:

1. What is the genetic basis of Down's syndrome?
2. How prevalent is Down's syndrome? How does prevalence of Down's syndrome vary by maternal age?
3. What is current procedure for Down's syndrome testing?
4. What is meant by an invasive prenatal diagnostic test?
5. What are the risks of invasive prenatal diagnostic tests?
6. What is the fundamental basic science discovery that opened up the possibility of a noninvasive prenatal genetic testing?
7. What is the basic goal of the Erich et al (2011) study?
8. How do the authors detect trisomy 21?
9. What is the accuracy of the NGS based test?
10. How did the authors establish the accuracy of their NGS based test?
11. Where institute are the authors from? Why is there a section in the affiliations on "Disclosure"?