

# Andrew Tolonen  
# 14mar13

MSSB section UE8C1 (10h): Genomic applications in environmental biotechnology

**Chair:** Jean Weissenbach

**Responsible:** Andrew Tolonen

**Presenters:** Jean Weissenbach (3h CM), Veronique de Berardinis (1.5h TD), Andrew Tolonen (2h CM, 3h TD)

### Summary

Recent advances in systems and synthetic biology have the potential to lead us towards a sustainable, bio-based economy that does not depend on fossil fuels for energy and commodities. This section of the course describes Genoscope projects that use high throughput biology to enable this vision. Jean Weissenbach introduces this section of the course by presenting "Grand challenges in environmental biotechnology: past and present". Veronique de Berardinis presents on high-throughput enzyme screening and enzyme promiscuity. Andrew Tolonen presents on new methods in synthetic biology and on applications of systems and synthetic biology to bioenergy.

### Example Lectures

Systems and synthetic biology for bioenergy:

[http://www.tolonenlab.org/Presentations/MSSB/mssb\\_tolonen\\_bioenergy\\_25oct12\\_2.pdf](http://www.tolonenlab.org/Presentations/MSSB/mssb_tolonen_bioenergy_25oct12_2.pdf)

Building with DNA, methods and applications (2 lectures):

[http://www.tolonenlab.org/Presentations/MSSB/mssb\\_buildingDNA\\_12oct12\\_2.pdf](http://www.tolonenlab.org/Presentations/MSSB/mssb_buildingDNA_12oct12_2.pdf)

[http://www.tolonenlab.org/Presentations/MSSB/mssb\\_buildingDNA2\\_25oct12.pdf](http://www.tolonenlab.org/Presentations/MSSB/mssb_buildingDNA2_25oct12.pdf)

### Exam

The exam format is variable and selected by the students. In 2011, we had a written exam based on Marliere et al, 2011 (PMID 21710668). Here is the exam:

[http://www.tolonenlab.org/Presentations/MSSB/mssb\\_examen\\_reponses\\_16jan12.pdf](http://www.tolonenlab.org/Presentations/MSSB/mssb_examen_reponses_16jan12.pdf)

In 2012, the students elected to form groups of 3-4 students and make 15 minute presentations on recent papers in systems and synthetic biology. Here are the papers we discussed: Zhang et al 2011 (PMID 21248753), Christen et al 2011 (PMID 21878915), Yeh et al 2006 (PMID 16550172), Widmaier et al 2009 (PMID 19756048).

Here are the slides from two of the presentations in december 2012:

Presentation on Zhang et al, 2011:

[http://www.tolonenlab.org/Presentations/MSSB/Exam2012/TALEs\\_presentation.pdf](http://www.tolonenlab.org/Presentations/MSSB/Exam2012/TALEs_presentation.pdf)

Presentation on Yeh et al, 2006:

[http://www.tolonenlab.org/Presentations/MSSB/Exam2012/drugInteractionPairs\\_presentation.pdf](http://www.tolonenlab.org/Presentations/MSSB/Exam2012/drugInteractionPairs_presentation.pdf)

## References

de Berardinis V, Durot M, Weissenbach J, Salanoubat M (2009). "*Acinetobacter baylyi* ADP1 as a model for metabolic system biology". *Curr Opin Microbiol.* 2009 Oct;12(5):568-76

de Berardinis V, et al. (2008). "A complete collection of single-gene deletion mutants of *Acinetobacter baylyi* ADP1." *Mol Syst Biol.* 2008;4:174.

Tolonen AC, Haas W, Chilaka AC, Aach J, Gygi SP, Church GM. (2011). "Proteome-wide systems analysis of a cellulosic biofuel-producing microbe". *Mol Syst Biol.* 2011 Jan 18;7:461.