Introduction to Statistical Inference

Offered by:	International Max Planck Research School for Cell, Developmental and Systems Biology (IMPRS-CellDevoSys)
Lecturer:	Christoph Zechner
Date:	12 – 28 March 2018
Time:	Lectures: 11-12am on Tuesday, Wednesday, Friday
Location:	CSBD, SR2 (3rd floor)
Target audience:	DIPP PhD students, MPI-CBG postdocs
No of participants:	20
Registration deadline:	31 January 2018
Pre-course work:	None
Course requirements:	Basic skills in mathematics

COURSE AIM:

Block 1: Lectures 1 – 4 + tutorial 1 + lab will cover basic concepts of statistical inference including the t-test, the chi-squared test and linear regression. The three-hour practical will involve real world experimental data and analyzing them with the techniques discussed in the class.

Block 2: Lectures 5 – 7 + tutorial 2 are more advanced (and optional). They will cover random variables and statistical models.

LEARNING OUTCOMES:

Students will understand the basics of statistical inference. They will be able to apply the acquired skills to analyzing and interpreting real world experimental data.

COURSE CONTENT/ METHODS ENCOUNTERED DURING THE COURSE:

Week 1:

Tue 13 Mar 2018, 11:00 - 12:00: **Lecture 1:** Mean, SD, SEM and presentation of data
Wed 14 Mar 2018, 11:00 - 12:00: **Lecture 2:** Student's t-test
Fri 16 Mar 2018, 11:00 - 12:00: **Lecture 3:** Assumptions behind the t-test

Week 2:

Tue 20 Mar 2018, 11:00 - 12:00:   **Lecture 4:** Chi-squared and linear regression

Wed 21 Mar 2018, 11:00 - 12:00:   **Tutorial 1**

                      14:00 - 17:00:   **Lab:** Statistical inference on experimental data

Fri 23 Mar 2018, 11:00 - 12:00:   **Lecture 5:** Probability, random variables and expectation

Week 3:

Tue 27 Mar 2018, 11:00 - 12:00:   **Lecture 6.** Examples of RVs; probability distributions

Wed 28 Mar2018, 11:00 - 12:00:   **Lecture 7.** Non-parametric tests; Bayesian approaches

                      14:00 - 15:00:   **Tutorial 2**

COURSE STRUCTURE:

The course will include lectures, tutorials, and exercises.

BACKGROUND READING:

http://www.graphpad.com/quickcalcs/ttest1.cfm

Larson HJ. 1974. *Introduction to Probability Theory and Statistical Inference.*New York: John

Wiley&Sons.

Rice, JA. 1995. *Mathematical Statistics and Data Analysis*. 2nd Edition. Duxbury Press, Belmont, California.

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