

Data analysis, scientific writing and publishing in Natural Sciences

Summer School: 01-05 October 2018

	Topic name	Learning outcomes	Learning activities/ Assignments	Basic learning materials
Day 1 <i>Morning Session</i>	Statistical research methods	Know basic technical-methodological aspects of designing experiments and surveys for data collection and statistical analysis in natural sciences	<i>Introductions:</i> Students state their research <i>Group Discussion:</i> Reflection on experimental designs used in groups of 5 and feedback <i>Short Presentation:</i> 5 Slides on summary of designs <i>Task:</i> Provide 6 scenarios of data collection on walls and participants choose the proper designs and paste cards <i>Reflection:</i> Reflect and discuss results	- Slides, Cards - Stick stuff - A handbook on research methods and statistics.pdf www.youtube.com/watch?v=PDjS20kic54
<i>Afternoon session</i>		- know the technical components and applications of hypothesis testing to different experimental designs - be able to select and use the accurate statistical analysis suitable for the data collected and the experimental design used	- Participants provide their own objectives and hypothesis of their work <i>Group discussion:</i> The collected objectives are randomly picked and given to groups of five to discuss and suggest the proper analysis in a Jigsaw method <i>Plenary session:</i> Groups feedback	- Cards and markers - Projector - Participants objectives and hypothesis
Day 2 <i>Morning Session</i>	Statistical Computing in R	- Be able read, write and save a simple R script in R studio - Be able to execute commands to read csv files in R - Know how to execute individual lines of an R script in R studio - Be able to arrange and analyze statistical data in the context of natural sciences in R - Be able to describe and visualize data by boxplots and simple statistics - Be able to execute commands to analyze data using ANOVA, t-test and linear regression	<i>Short Presentation:</i> Brief introduction and demonstration of R language <i>Guided Practical session:</i> Guided scripting using R-studio for common descriptive statistics, ANOVA, t-test, regressions <i>Task:</i> Participants work with their own data <i>Support and interactive feedback:</i> Participants are supported and given simultaneous interactive feedback on their challenges	- Computer lab - R-scripts - Prepared worksheets - eBooks R for dummies https://stackoverflow.com/questions/15289995/how-to-get-help-in-r
<i>Afternoon session</i>		Able to present, interpret and discuss the results derived from R-software analysis according to Natural Sciences standards	<i>Presentations:</i> Participants present outputs to the group and interpret their analysis <i>Plenary session:</i> Reflection of lessons learnt	
Day 3 <i>Morning Session</i>	E -resources	- Identify and use credible available e-resources sites - know the principles of protecting works through copyright on the internet	<i>Reflection:</i> Participants discuss the E-resources they have used from experience <i>Guided Practical Session:</i> Search and reframe narrow searches based on their specific subject need;	- Computers and access to internet www.sciencedirect.com www.bioone.org www.elsevier.com www.springer.com
	References management	- are aware of reference software opportunities in their academic discipline - Identify and use Mendeley - Be able to register and manipulate both desktop and online Mendeley library - Be able to use the Mendeley plug in in Microsoft word	<i>Short Presentation:</i> 5 Slides on summary of reference software <i>Downloading and Installation:</i> Mendeley software and plugin <i>Task:</i> Create own Mendeley library and connect to Microsoft word document <i>Support and interactive feedback:</i> Participants are supported and given simultaneous interactive feedback on their challenges <i>Task:</i> Write one paragraph and insert references and present to the group	www.mendeley.com
<i>Afternoon Session</i>	Manuscript writing	- Ability to develop a publishable draft manuscript - know strategies to utilize academic texts written in English; - are able to improve their formulation of academic texts in English; - identify individual challenges in manuscript writing	<i>Reflection:</i> Challenges in manuscript writing from experience. <i>Reading and discussion session:</i> Participants read from a given resource <i>Group discussion:</i> Participants discuss in a jigsaw fashion the sections of a paper i.e Abstract, Introduction, Methods, Results, Discussion and Conclusion <i>Feedback session:</i> Presentations of contents for each category <i>Individual manuscript revision:</i> Participants revise and improve their own manuscripts	https://journals.jsap.jp/wp-content/uploads/how_to_write_res_paper.pdf https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously
Day 4 <i>Morning Session</i>	Manuscript writing	- Acquire skills to communicate research findings in line with natural sciences standards - Attain critical manuscript review skills - Able to identify errors and know common errors found within manuscripts sent to journals in natural sciences.	<i>Pair paper exchange:</i> Participants exchange their prepared manuscripts and conduct peer review. <i>Plenary session:</i> Feedback on some of the common errors observed from peers <i>Individual manuscript revision:</i> Participants revise and improve their own manuscripts	
<i>Afternoon Session</i>	Publishing	- Identify the relevant journals for their research - Differentiate terminology used in publishing e.g. open access, impact factor, peer reviewing, proprietary journals - Ability to format manuscript according to journal requirements - are aware of publishing opportunities in their academic discipline	<i>Pair discussion:</i> Discuss importance of publishing <i>Reflection:</i> share your experiences <i>Video:</i> On publishing terminology and concepts <i>Practical session:</i> Search the ‘About’ page of one credible and one predatory journal and give feedback <i>Task:</i> Search and list 4 possible journals for your research and give feedback <i>Homework:</i> Format your manuscript in line with selected journal	- Computers/tablets https://www.youtube.com/watch?v=mfzF_XRgt3Y
Day 5 <i>Morning Session</i>	Response to reviewer comments	- Ability to interpret and react to reviewer’s feedback/comments - Be aware of the language used to respond to reviewer comments	<i>Group discussion:</i> Provide comments from reviewers of previously published work; participants discuss and react to the comments <i>Plenary session:</i> Random evaluation of Lessons learnt	Reviewer comments from submitted manuscripts
<i>Afternoon Session</i>	Scientific poster development and presentation	- Aptitude to communicate and present their results using a poster - Be able to design a clear and readable poster using the poster making standards - Be able to condense the ideas enough for a 3 min presentation for a poster	<i>Brief presentation:</i> Contents of poster <i>Video:</i> how to develop a scientific poster <i>Guided practical:</i> Use power point to design a poster <i>Task:</i> Prepare own poster from own manuscript <i>Display and present poster:</i> 3 min presentation	- Printer and A0 material https://www.youtube.com/watch?v=PwJu7H66T3Y https://projects.ncsu.edu/project/posters/