C4b: Philosophy of Science and Natural Science Methods

Instructors: Aravind Madhyastha (Coordinator), R. Ganesan (Co-coordinator), Kartik Shanker, Priyadarsanan Dharma Rajan, Rengaian Ganesan, Soubadra Devy, T. Ganesh

Number of credits: Two credits

Lectures: Tuesdays (1400-1450) Thursdays (1000-1050)

Field Course: (2-15 May)

Objectives

The first part of this course is designed to familiarize students with the history, evolution and philosophy of science. Students will also be exposed to the formulation of concepts, developing methods and analysis. Each student is expected to write a couple of papers in which they will create their own philosophical arguments to provide a clear and consistent defence on a topic of their interest and its ethical considerations. The second part of the course is intended to acquaint students with the basic methods commonly employed by natural scientists. The course will begin with lectures on the theoretical concepts underpinning each type of sampling, when to use what followed by a 10 day field component.

Outcomes

The course is expected to build the capacity of students to develop design & implement research projects in ecology. The students will develop small research projects, implement in the field and write a paper and present their findings with a clear hypothesis, rationale, sampling design, methodology, analysis, results and conclusion which is of publishing standard.

Course assessment

Philosophy of Science Assignments (25%), Mapping and Field Notes (25%), Course Manuscript (40%), Attendance and participation (10%)

Readings

1. Alpizar-Jara, R. (2006), Advanced Distance Sampling: Estimating Abundance of Biological Populations Edited by S. T. Buckland, D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. Biometrics, 62: 940–941. doi: 10.1111/j.1541-0420.2006.00588_1.x

2. Buckland ST, Anderson DR, Burnham KP et al (eds) Advanced distance sampling. Oxford University, Oxford

3. Karban, R., and Huntzinger, M. (2006) How to Do Ecology: A Concise Handbook. Princeton, NJ: Princeton University Press

4. Krebs Charles J. ,1998, Ecological methodology Pub. Benjamin Cummings.

5. MacKenzie Darry, James Nichols, J. Royle, Kenneth Pollock, Leslie Bailey and James Hines Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurrence, ELSIVIER.

6. Michael Joseph Ryan,2001. Anuran Communication, Smithsonian Institution Press

7. Morrison, M. L., Marcot, B. G., & Mannan, R. W. (1998). Wildlife-habitat relationships: concepts and applications. Island Press.

8. Ruxton, G.D. and Colegrave, N. 2003. Experimental design for the life sciences.

9. Southwood T. R. E. , Peter A. Henderson 1998. Ecological Methods, 3rd Edition Wiley-Blackwell

Course Schedule

Sl No.	Date	DoW	Topics	Instructor
1.	9-Jan-18	Tue	Introductory class	Aravind
2.	11-Jan-18	Thu	Science, Non- science and nonsense: Defining truth, reality and Science	Priyan
3.	16-Jan-18	Tue	History and Evolution of Scientific thought: How man invents the Science	Priyan
4.	18-Jan-18	Thu	History and Evolution of Scientific thought: How Science shapes the man	Priyan
5.	23-Jan-18	Tue		**No class**
6.	25-Jan-18	Thu	The Components of Science	Priyan
7.	30-Jan-18	Tue	The epistemology of Science	Priyan
8.	1-Feb-18	Thu	*TBC*	Kartik
9.	6-Feb-18	Tue	*TBC*	Kartik
10.	8-Feb-18	Thu	Curation of data	Aravind
11.	13-Feb-18	Tue	Doing Ecology in field	T Ganesh
12.	15-Feb-18	Thu	Hypothesis testing	T Ganesh
13.	20-Feb-18	Tue	Sampling populations	Aravind
14.	22-Feb-18	Thu	Sampling populations	Aravind

15.	27-Feb-18	Tue	Sampling vegetation	R Ganesan
16.	1-Mar-18	Thu	Sampling insects	Priyan
17.	6-Mar-18	Tue	Plant-Animal Interaction	Soubadra
18.	8-Mar-18	Thu	Plant-Animal Interaction	Soubadra
19.	13-Mar-18	Tue	Geography for Conservation	Aravind
20.	15-Mar-18	Thu	Big data and Data Mining	Aravind
21.	20-Mar-18	Tue	Big data and Data Mining	Aravind
22.	22-Mar-18	Thu	Integrating Natural and Social Sciences	Soubadra