

UNU Institute for the Advanced Study of Sustainability (UNU-IAS)
Spring 2021 Semester-Competency Course

As of March 01, 2021

Title of Course: Environmental Statistics and Research Methods (ESRM)

Coordinators: Kensuke Fukushi, Javzan Sukhbaatar,

Course Schedule: Please see the schedule

Course description: The research design and methodology is a course designed to help the students in developing their research proposal. This course is focused on the application of relevant research methodology for the research problems that students are interested to solve. This course aims at active discussion and presentation of research proposal by the participants based on the solid academic and practical readings. Individual consultation of students with professors is expected to take place during the semester. Critical analysis of relevant research articles is a part of the requirements. Considering that environmental investigation often covers a broad range of disciplines from the social science to natural science, and the study systems/problems are complex, the course contain information about the main statistical methods to interpret project results.

Course Learning Objectives:

1. Enhance students' understanding of the research process from idea formulation through data analysis and interpretation;
2. Enable students to use gained knowledge to design their own research on a topic of personal interest;
3. Improve students' ability to critically read and understand the research literature; and
4. Improve students' confidence in applying selected research methods.

Course Outline

Lecture	Date	Content	Instructor
Lecture 1	April 5 th 16:00-17:30	Introduction to the course Introduction to research: Why research is of value, what is research, business research, applied and basic (fundamental) research, Scientific Research Process: Purposiveness, rigor, testability, replicability, precision & confidence, objectivity, generalizability	Dr. Sukhbaatar
Lecture 2	April 12 th 16:00-17:30	Types of research: experimental, correlational, survey, ethnographic, historical, and action research, case study - General types: descriptive, associational, intervention; - qualitative & quantitative	Dr. Sukhbaatar
Lecture 3	April 19 th	- The research process: Broad problem	Dr. Sukhbaatar

	16:00-17:30	area, research problem statement, research questions, characteristics of good research questions, hypotheses, variables	
Lecture 4	April 26 th 16:00-17:30	Theoretical/conceptual framework: why you need one, purpose, usefulness, hypotheses development, primary and secondary data sources	Dr. Sukhbaatar
Lecture 5	May 10 th 16:00-17:30	Literature review: reasons, how to write literature review, sources	Dr. Sukhbaatar
Lecture 6	May 17 th 16:00-17:30	Data collection methods : observation, interview, questionnaire, other methods of data collection, issues in data collection, survey research	Dr. Sukhbaatar
Lecture 7	May 24 th 16:00-17:30	Sampling: basic assumptions, process, types, and sizes	Dr. Sukhbaatar
Lecture 8	May 31 th 16:00-17:30	Data analysis and interpretation: quantitative data analysis, coding, entry, testing goodness of data, analysis methods, interpretation and inference	Dr. Sukhbaatar
Lecture 9	June 7 th 16:00-17:30	Qualitative research methods and data interpretation	Dr. Sukhbaatar
Lecture 10	June 14 th 16:00-17:30	Chi-square Test -Chi-square as a Test for Comparing Variance -Chi-square as a Non-parametric test -Conditions for the Application of Chi-square test -Hands-on exercise of Chi-square test using SPSS software	Dr. Sukhbaatar
Lecture 11	June 21 th 16:00-17:30	Analysis of Variance and Covariance -What is ANOVA -Basic Principle of ANOVA -ANOVA Technique -Analysis of Co-variance (ANOCOVA) -Hands-on exercise of ANOVA test using SPSS software	Dr. Sukhbaatar
Lecture 12	June 28 th 16:00-17:30	- Description of the data and analysis methods Examples of multivariate regression and hands-on exercise using SPSS software	Dr. Sukhbaatar
Lecture 13	July 5 th 16:00-17:30	Research proposal/report: components and structure, types of report (article, report, monograph, master's paper, doctoral thesis) Academic writing standards	Dr. Sukhbaatar
Lecture 14	July 12 th 16:00-17:30	Research implications and discussion, research ethics (interpretation of research findings, defining research implications for future research and policy and practice, discussion of research	Dr. Sukhbaatar

		findings in light of previous research research ethics)	
Lecture 15	July 19 th 16:00-17:30	- Student presentation of research proposal, course evaluation	Dr. Sukhbaatar

Assessment:

- Class participation: 30%
- Research report/article analysis: 20%
- Research proposal writing and presentation: 50%

Text books and reading materials:

Textbooks

1. How to design and evaluate research in education (ninth edition) by Jack Fraenkel & Norman Wallen 2014 McGraw-Hill Companies New York, NY
2. Educational research: Planning conducting, and evaluating quantitative and qualitative research. John W. Creswell, (fifth edition) 2014 Pearson Education, Inc., Upper Saddle River, New Jersey.
3. Survey research methods (fifth edition) by Floyd J. Fowler, Jr. (Applied social research methods; v.1) 2014 Sage Publications, Inc., Thousand Oaks, CA
4. Moustakes, C.E. 1994 *Phenomenological research methods*. Sage publications, Inc. Thousand Oaks, CA
5. Efron S.E., & Ravid R., 2013. *Action research in education: a practical guide*. The Guilford Press. New York, NY
6. Creswell J. W., & Poth C.N. 2018. *Qualitative Inquiry & research design: Choosing among five approaches*. Sage Publications, Inc. Thousand Oaks, CA
7. C. Philip Wheater & Penny A. Cook (2000): *Using Statistics to Understand the Environment*, Routledge.
8. Breakwell G.M., Hammond S., Fife-Schow C., & Smith J.A (eds) 2006 *Research Methods in Psychology*. Chapter 6 Surveys and Sampling. Sage publications, Inc. London
9. Walford G., Tucker E., & Wiswanathan M. 2010 *The Sage Handbook of Measurement*. Chapter 6: Studying Teacher Effectiveness: The Challenges of Developing Valid Measures. Sage Publications, Inc. London

Additional reading materials

To be determined and selected by instructors for each session.