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

Coordinators: Kensuke Fukushi, Javzun Sukhbaatar,

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

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<tr>
<th>Lecture</th>
<th>Date</th>
<th>Content</th>
<th>Instructor</th>
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<tr>
<td>Lecture 1</td>
<td>April 5th 16:00-17:30</td>
<td>Introduction to the course <strong>Introduction to research:</strong> Why research is of value, what is research, business research, applied and basic (fundamental) research, <strong>Scientific Research Process:</strong> Purposiveness, rigor, testability, replicability, precision &amp; confidence, objectivity, generalizability</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 2</td>
<td>April 12th 16:00-17:30</td>
<td><strong>Types of research:</strong> experimental, correlational, survey, ethnographic, historical, and action research, case study - General types: descriptive, associational, intervention; - qualitative &amp; quantitative</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 3</td>
<td>April 19th</td>
<td>- <strong>The research process:</strong> Broad problem</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 4</td>
<td>April 26th 16:00-17:30</td>
<td><strong>Theoretical/conceptual framework:</strong> why you need one, purpose, usefulness, hypotheses development, primary and secondary data sources</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 5</td>
<td>May 10th 16:00-17:30</td>
<td><strong>Literature review:</strong> reasons, how to write literature review, sources</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 6</td>
<td>May 17th 16:00-17:30</td>
<td><strong>Data collection methods:</strong> observation, interview, questionnaire, other methods of data collection, issues in data collection, <strong>survey research</strong></td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 7</td>
<td>May 24th 16:00-17:30</td>
<td><strong>Sampling:</strong> basic assumptions, process, types, and sizes</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 8</td>
<td>May 31st 16:00-17:30</td>
<td><strong>Data analysis and interpretation:</strong> quantitative data analysis, coding, entry, testing goodness of data, analysis methods, interpretation and inference</td>
<td>Dr. Sukhbaatar</td>
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<td>Lecture 9</td>
<td>June 7th 16:00-17:30</td>
<td><strong>Qualitative research methods and data interpretation</strong></td>
<td>Dr. Sukhbaatar</td>
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| Lecture 10 | June 14th 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 21st 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 28th 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 5th 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 |
<p>| Lecture 14 | July 12th 16:00-17:30 | <strong>Research implications and discussion, research ethics</strong> (interpretation of research findings, defining research implications for future research and policy and practice, discussion of research) | Dr. Sukhbaatar |</p>
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<tr>
<th>Lecture 15</th>
<th>July 19th 16:00-17:30</th>
<th>Student presentation of research proposal, course evaluation</th>
<th>Dr. Sukhbaatar</th>
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**Assessment:**
- Class participation: 30%
- Research report/article analysis: 20%
- Research proposal writing and presentation: 50%

**Textbooks and reading materials:**

**Textbooks**

**Additional reading materials**
To be determined and selected by instructors for each session.