PhD Programme in Sustainability Science at Stockholm Resilience Centre

An introductory Course to PhD studies at Stockholm Resilience Centre

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Brief Description

This course is an introduction to advanced research studies for new doctoral students enrolled in SRC's PhD program. It communicates the research framework that is used by centre researchers, clarifies "ways of thinking and practicing" and "tacit knowledge" at SRC, i.e. the "softer" values that are essential for multi- and transdisciplinary advanced research at SRC. The course identifies outstanding major research challenges and research fronts in order for the PhD student to be able to understand where they can situate their research, and also how their research can contribute to developing any or several of these fronts. The course also relate the SRC "branch" of Sustainability Science to a wider historical context including fields of philosophy of science and provide practical advice on methods and approaches that will guide the PhD student in his or her research. The final exercise and examination is aimed to help the PhD student take a step forward in its current research paper/project. The course aims to take on a number of questions that many students ask themselves, including: What is it that is special with SRC, How are scientists working here, How can I fit in, What is my contribution, and How should I focus my work right now?

Motivation of the course structure, content and examination

This course draw on the combined "institutional memory" at SRC, by engaging a majority of all senior researchers, all of which have different perspectives and knowledge of research and the challenges associated with doing a multidisciplinary/transdisciplinary PhD project. The course also intends to take in to account the diverse previous experience that all PhD students have assimilated.

This course seeks to resemble the working tradition at SRC. That is, it should be inclusive, dynamic and sharing. The course should, as far as possible, build on "mentorllectual dialogues" (i.e. dialogues between 'intellectual mentors' and with students), rather than traditional lectures. These dialogues will be structured around 2-3 senior researchers with different research background who in dialogue discuss the issue(s) for the day. However, the dialogues should be flexible enough to include thoughts/questions addressed by the students. The rational behind using mentorllectual dialogues is to bring out a broader range of experiences and the tacit knowledge that exists at SRC.

The role of collaborative learning during this course will be an important aspect of building a multidisciplinary group, which includes a large number of different background and nationalities. The design of the course, ands its inclusion of three separate components, will help the students to successively link novel material and concepts to their previous experience. The discussions, and primarily the individual task for the exam (where the learning outcomes will be evaluated, see below), will enable students to extrapolate their learning in to potential future developments of their respective PhD projects.

The examination of the course will be an individual written task, where students will relate their new knowledge about research frameworks, types of collaboration and papers, existing research fronts, different approaches to conducting science, and novel methods, to their individual PhD projects. The examination will be evaluated as either "pass" or "fail" but the

ambition is that the students will be well motivated to carry out this task, as it is intended to be a substantive way of thinking about how to further develop each individual PhD plan for the coming years.

Detailed description of the three sections of the course:

Section 1. Basics of doing research at SRC.

15/9: An introductory dialogue will describe the research framework used, with a number of concrete examples. The students will have been asked to read a number of scientific papers beforehand and to come prepared for discussing the reading material and their own research projects in relation to this research framework.

16/9: Collaboration is a key ingredient when working in multidisciplinary teams. Different forms of collaboration will be described during the morning and discussions will follow on benefits and problems with different ways of collaborating. The previous (good and bad) experiences of the students from collaborating across disciplines will be discussed in smaller groups. The afternoon will be devoted to address a number of potentially unpleasant challenges that may occur when collaborating in large groups, using mock examples.

23/9: An introductory dialogue will provide an overview of existing research frontiers and exciting new areas that are currently in development. The lecture will be held by the research director of the centre and intends to stimulate the students to think about how they can relate their own research to exciting new scientific developments. The afternoon will be devoted to discussing their individual projects in relation to these research fronts, as perceived by the scientific leadership of the centre.

25/9: An introduction to research ethics: What permits do you need, how should you operate in the field and how to deal with sensitive data? What are common mistakes and misunderstandings?

Section 2: Linking theory to research questions

18/9: Students will attend an introductory lecture on the philosophy of science, specifically tailored to be relevant for Sustainability Scientists. This lecture will describe very different scientific disciplines and approaches, and provide a starting point for the discussions to follow. Here, students will discuss the literature on their reading list, and relate the approach, content and theoretical starting points for some of the articles in the reading list. This will provide practical guidance on very different scientific approaches and will be an opportunity to align the perceptions of different disciplinary traditions between students representing different disciplines.

19/9 This day start with an introduction of the specific challenges with doing multidisciplinary and transdisciplinary science. The lecture will be followed by a discussion of different types of scientific approaches (stimulated by the reading material due for this day). The key challenge of PhD students to balance working in depth with a specific case study/method/approach, vs. a broader, but more shallow approach.

22/9: Sustainability Science and Resilience research has a relatively short academic tradition. Theories, concepts and terminologies are therefor not as established as in other, older scientific disciplines. This has generated both confusion, but also criticism. A lecture that summarizes the concepts used and associated criticism, will lead to a discussion on what type of criticism is valid and how to relate to that when conducting research.

23/9: This day will start with group discussions where the content of the course thus far is related to individual research projects. The course leaders will provide individual tutoring to students before lunch and then work on individual assignments commence.

Section 3: Basic approaches, methods and the art of writing papers
26/9: After several days of frameworks, concepts and theories, this section will become much more practical. The first day will provide an inventory of different methods that the students can use during their PhD studies. The afternoon will be a full session of speed talks by senior researchers and PhD students a few years in to their project, that provide concrete examples of outcomes (i.e. papers) and the methods and approaches that were used for those papers.

29/9 We will describe different types of approaches for writing papers and the types of questions different papers can address. The dialogue will draw on papers in the reading list and will be followed by a discussion of e.g. how different types of papers fill different functions and how different PhD projects may benefit from one or the other type of paper.

30/9 Going from an idea to a finished paper is often a long and challenging road. This day will explore how to conceptualise and sharpen unique ideas in order to be able to study it. The students will now be well aware of the research frontiers to address and have an understanding of the methods available to them, as well as an understanding of different types of papers. This information combined will feed in to an exercise when students are encouraged to think actively about how their individual project can connect to other colleagues. This discussion will in part function as a peer assessment of students thinking of their assignment and also be an important stimulus for the students to continue working on their individual assignment.

Course Learning Outcomes

It is expected that the student, after taking the course, will have:
1) An in depth understanding of SRC Vision, Mission and Research Framework
2) An understanding of the SRC "software" (signatory pedagogy) – i.e. the ways in which we work and key things that signifies the collaborative mode necessary for successful transdisciplinary Sustainability Science.
3) An understanding of key research fronts, as perceived by SRC senior researchers, and an understanding of how their individual research projects can relate to these fronts.
4) An understanding of important historical scientific and philosophical contexts of relevance for their individual PhD project
5) Knowledge about methods and tools of value for their individual PhD project
6) Have an introductory knowledge about different types of research papers and understanding of how to relate different types of question to different kinds of papers.

The ambition is that the course should be compelling to students by constituting a perceived important step forwards towards becoming independent researchers, that it will be *conceptual* as it teaches key concepts and skills that student will use throughout their education, and also that it is *constructively aligned*, with a clear connection between learning activities, assessment tasks and learning outcomes. The course will also be *challenging*, by introducing a number of complex issues and with high expectations that students are able to master them. The course will be very *consistent* with existing institutional values and well *connected* to the individual current situation the students are in their education.

Sections, Concepts, methods and applications

The course consists of three different sections, covering: The first section: Basics of doing research at SRC (4 days). This section introduces students to the research framework used by Stockholm Resilience Centre and how it relates to other aspects of Sustainability Science. This section also covers some fundamental aspects of the type of collaboration that is carried out at the centre (and which is different from many academic institutions) and identifies a number of research frontiers, which students can relate their individual research projects to. The second section: Linking theory to research questions (5 days) addresses important aspects of the philosophy of science, directly related to conducting multidisciplinary Sustainability Science. This section covers key theoretical concepts and include seminars on how to relate to them when practically carrying out research, while also containing lectures and discussions on special challenges and opportunities associated with conducting multidisciplinary research. The students will start working on their individual work during this section. The third section: Basic approaches, methods and the art of writing papers (5 days) provides more hands on advice on how to develop and carry out research during the students' PhD.

Concepts	***Methods***	**Applcations**
Component 1: Doing Research at SRC		
Introducing the research framework Introducing means to effectively collaborate in research groups with a diversity of disciplinary/cultural backgrounds Introducing research frontiers	Lectures and discussions. Exercises that exemplifies awkward situations that may occur in larger groups with different disciplinary and cultural backgrounds	An introduction to the community of practice at SRC
Component 2: Linking theory to research questions and design		
Introducing different scientific epistemologies as a starting point for thinking about addressing multidisciplinary challenges Ways in which concepts and theories used by sustainability scientists can be criticised Understanding fundamental differences between within vs. multidisciplinary science	Lectures, discussions and seminars	Provides a fundamental understanding of the scientific context in which the PhD will operate.
Component 3: Basic approaches, methods and the art of writing papers		
Key methodologies used Basic aspects of writing scientific papers From an idea to a finished paper	Lectures and discussion. Work on individual essay that connects learning within the course to the students individual PhD project	The students will be introduced to the "tools of the trade"

Schedule September 15th to October 3rd

	Lectures	*Class exercises*	Home work
Week 1:			
SEPTEMBER **Mon 15** **10:00-12:00**	**AM:** Sustainability Science and Biosphere Stewardship (HÖ and LG)		
Tue 16 **10.00-12.00** **13.00-15.00**	**AM:** How to collaborate, share ideas and respect IPR (MN and PO)	**PM: Workshop** (MN and PO) Group Discussions using mock examples of conflict in relation to authorship issues, non-respect for IPR and means of sanctioning	
Wed 17	**READING DAY –** Old classics that illustrate the history of Sustainability Science and novel papers that illustrates interesting research fronts		
Thu 18 **10:00-12:00** **13:00-15:00**	**AM:** Philosophy of Science – an introduction (verification vs. falsification, inductive vs. deductive, realist vs social-constructivism). TH and WB	**PM:** Seminar based on literature and philosophy of science lecture, deconstructing and understanding some of the classics. (WB)	
Fri 19 **10.00-12.00** **13.00-14.30**	**AM:** Start work on individual assignment	**PM:** Basics of transdisciplinary science – what is it and how is it different (FW)	
Week 2:			
Mon 22 **10.00-12.00**	**AM:** Concepts used and abused by Sustainability Scientists (GP)	**PM:** Discussion - What critique is valid and what is not? How to deal with critique? (GP)	
Tue 23 **10.00-12.00** **13.00-15.00**	**AM:** Frontiers of Sustainability Science (CF)	**PM: I**ndividual coaching: How does my research approach and PhD project relate to concepts addressed in the previous days? (HÖ and MN)	
Wed 24	**READING DAY** – Read a range of papers which illustrate different ways of doing transdisciplinary papers, including in Science, Nature, Ecological, Social, integrated, Poiicy Forums, Opinions, etc		
Thu 25 **10:00-12:00**	**AM:** Research ethics (MH, TD)	**PM:**	
Fri 26 **10.00-12.00**	**AM**: An inventory of different methodologies used by Sustainability Scientists and description of support capacity at SRC (ÖB)	**PM:** How did you do it, specific case studies and how they were carried out (several speed talks by a large number of SRC researchers)	
Week 3:			
Mon 29 **10.00-12.00** **13.00-15.00**	**AM**: The art of writing papers – what kind of papers are there and what kind of questions to they address? (MN and HÖ)	**PM:** Discussion on different types of papers – which are the distinguishing features and how to know when to focus on what type? (MN and HÖ)	
Tue 30 **10.00-12.00**	**AM:** Conceptualising, studying and pinning down your unique idea – how to do it? (LS, SB)	**PM:** Work on individual assignment	
OCTOBER **Wed 1** **21.00**	**Work on individual assignment** BuzzBeat - celebration		
Thu 2 **10.00-12.00** **13.00-14.00**		**AM:** Submission of individual assignment **PM:** Preparation for peer	

		assessment and self assessment
Fri 3 **10.00-12.00** **13.00-15.00**	**PM:** Wrap up and evaluation (MN, HÖ)	**AM:** Show and tell results from exercise – my way forward

HÖ (Henrik Österblom), LG (Line Gordon), MN (Magnus Nyström), CF (Carl Folke), GP (Garry Peterson), FW (Frances Westley), ÖB (Örjan Bodin), TB (Thorsten Blenckner), TH (Thomas Hahn), BC (Beatrice Crona), PO (Per Olsson), LS (Lisen Schultz), SB (Stephan Barthel), EA (Erik Andersson), MB (Miriam Huitric), TD (Tim Daw)

Assessment and Grading

Examination will be conducted through one written and oral presentation that described critical next steps in a selected research paper that the student is currently working on, combined with a peer assessment of another students written assignment.

Component	Weighting (%)	Learning Outcomes
Written assignment	50%	1-5
Oral presentation	20%	1-5
Peer Assessment	20%	1-5
Self Assessment	10%	1-5
Attendance in class and discussion	Compulsory	1-5
Module Review	Compulsory	
	100%	

Attendance of lectures is compulsory. Attendance means active participation. The student should be prepared for and take an active role in class discussions. The individual course evaluation at the end of the course is compulsory.

Reading list (information is provided upon registration)