



GÖTEBORGS UNIVERSITET

Faculty of Science
Department of Biological and Environmental Sciences and
Department of Marine Sciences

Transdisciplinary approaches to sustainable marine aquaculture, 4 ETC

Third cycle education

1. Confirmation

The syllabus was confirmed by the Heads of the Department of Biological and Environmental Sciences and Department of Marine Sciences, 2018-01-25

The course plan is valid from 2018-01-25.

Disciplinary domains: Multidisciplinary: natural science, social sciences and arts

Departments in charge are: SWEMARC including Department of Biological and Environmental Sciences, Marine Sciences, Law, Business and administration and Academy of Design and Crafts and University and Department of Marine Sciences and The Institute for North Atlantic Studies (UNE NORTH) at University of New England, Portland, Maine, USA.

Main field of study: Sustainable Marine Aquaculture

2. Position in the educational system

Elective course; third-cycle education.

3. Entry requirements

Students should be admitted to third cycle education. Students with PhD subjects related to the course will be given priority and researchers and senior researchers within the subject area of the course will be admitted if space allows.

4. Course content

A main focus of the course is to present and discuss transdisciplinary methodologies as well as discuss their implementation on the development of sustainable marine aquaculture. The students will study the principles of carrying capacities, from ecological, economic and social perspectives and relate to the designs, engineering, management and governance of the world's major aquaculture farming ecosystems (shrimp, tuna, tilapia,



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shellfish, seaweeds, salmon). The course will further document the history (and gender roles, e.g. “her-story”), status and future of these as integrated, seafood ecosystems. The process of marine spatial planning, an arena for negotiating conflicts among stakeholders and user interests, will be studied. Methods and tools for predictive modeling and mapping of biodiversity using ecological data, state-of-the-art statistical methods and GIS will be presented and combined with approaches for integrating information collected by stakeholders. The students will be introduced to “The Triple Helix model”, a useful approach for integrating academic, public and industry partners. The course will also cover participatory design process focuses on co-creation and prototyping as ways to unify stakeholder collaboration.

The course is a collaboration between SWEMARC at University of Gothenburg and University of New England, Portland, Maine, USA. The course was given first time fall of 2017 and are from then planned to be given every other year at UNE, Portland Maine and every other year at Sven Lovén Center Kristineberg and Tjärnö, GU, Sweden with next course at UNE, Maine in the fall of 2018.

The course includes lectures; student oral presentations; and intensive group studies in collaborative team projects. Each student is expected to perform a literature review which should be summarized in a report and presented orally at seminars during the course. Seminars will also be held to put the lectures in perspective and to combine the information from different sections into a more general context as well as providing an opportunity to discuss issues in more detail.

Study trips to aquaculture sites along the west coast of Sweden or in Maine, USA will deepen the theoretical aspects of the lectures, allowing the course participants to get a more thorough understanding of the possibilities, obstacles and drawbacks of the discussed methodologies and systems.

5. Outcomes

After completion of the course the Ph.D. student is expected to:

1. Knowledge and understanding

describe transdisciplinary methods for early stakeholder involvement.

have gained increased understanding on “The Triple Helix model”, participatory design, co-creation and prototyping as ways to unify stakeholder collaboration

describe the concepts of carrying capacities



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describe ecological, economic and social perspectives of the world's major aquaculture farming ecosystems

2. Skills and abilities

be able to independently and critically analyze and synthesize knowledge on a specific topic from the scientific literature

3. Judgement and approach

critically evaluate different aquaculture techniques and solutions to environmental problems in the perspective of sustainable mariculture.

6. Required reading

The reading list is supplied separate to the syllabus. Students are required to read the assigned literature and prepare before attending the on-site part of the course in Sweden or USA.

7. Assessment

All course activities during the intensive on-site part of the course are compulsory. Each student should perform a project in group and present the result in the form of a short communication and a Poster. Study groups will be formed at the start of the course and daily progress in scheduled "bee-hives" will progress the project during the on-site part of the course. Students will be provided with all materials generated in the course and are expected to deliver a short report of 3~5 pages on an area of emerging social-ecological systems and/or transdisciplinary approaches to aquaculture, due 4 weeks from the end of the course for 4 ECT credits. Daily work products are expected and the student groups should continuously, during the on-site part of the course, orally present the development of their work. The examination is based partly on the written report and partly on the oral presentations and bee hives. In addition, active participation in lectures and seminars is required to obtain the grade Pass. Active participation means that the student should be prepared and able to discuss subjects addressed in the lectures based on the recommended literature. In case of valid absence from the scheduled oral presentations re-examination is offered in the form of submission of a more extensive and detailed written report.

A Ph.D. student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Department.



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In case the course has been discontinued or major changes have been made a Ph.D. should be guaranteed at least three examination occasions (including the ordinary examination occasion) during a time of at least one year from the last time the course was given.

8. Grading scale

The grading scale comprises Fail (U), Pass (G)

9. Course evaluation

Course evaluation is carried out together with the Ph.D. students at the end of the course, and is followed by an individual, anonymous electronic survey.

10. Language of instruction

The language of instruction is English.



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Syllabus: Transdisciplinary approaches to sustainable marine aquaculture, 4 ETC

Course period: fall of 2018 and then yearly – every other year in USA and every other year in Sweden	Location of the course 2018: University of New England, Portland, Maine and 2019: Sven Lovén Center Kristineberg and Tjärnö, GU, Sweden.
Course leaders/main applicants: Kristina Snuttan Sundell, SWEMARC and Dept. Bioenv. and Prof Barry Costa-Pierce, SWEMARC GU and University of New England: kristina.sundell@bioenv.gu.se and bcostapierce@une.edu	
<p>Background:</p> <p>Aquaculture holds tremendous promises to alleviate the global increased demand for food. The rapid growth of the aquaculture sector has, however, also lead to concerns for environmental impacts such as impacts on biodiversity, nutrient pollution, biological pollution, invasive species, the use of wild fish and soya for meal and oil production. Comprehensive planning for sustainable seafood production not includes only technical, ecological, and biological concerns, but must also involve interactions between the aquaculture industry, researchers, authorities, and the public at several levels.</p> <p>Aim of the course:</p> <p>This PhD course, jointly hosted by SWEMARC including the departments of Biology and Environmental Sciences, Marine Sciences, Law, Business and economics and Arts and design in Sweden and University of New England, Portland, Maine in the USA, aims at presenting and discussing trans- and interdisciplinary methodologies to study the world's aquaculture ecosystems and their possibilities to develop sustainability, from both environmental and social perspectives.</p> <p>Course content:</p> <p>A main focus of the course is to present and discuss transdisciplinary topics and methods as well as discuss their implementation on the development of sustainable marine aquaculture. The students will study the principles of carrying capacities, from ecological, economic and social perspectives and relate to the designs, engineering, management and governance of the world's major aquaculture farming ecosystems (shrimp, tuna, tilapia, shellfish, seaweeds, salmon). The course will further document the history (and gender roles, e.g. "her-story"), status and future of these as integrated, seafood ecosystems. The process of marine spatial planning, an arena for negotiating conflicts among stakeholders and user interests, will also be studied. Methods and tools for predictive modeling and mapping of biodiversity using ecological data, state-of-the-art statistical methods and GIS will be presented and combined with approaches for integrating information collected by stakeholders. The students will be introduced to "The Triple Helix model", a useful approach for integrating academic, public and industry partners. The course will also cover participatory design processes within the transdisciplinary approach that focus on co-creation and prototyping as ways to unify stakeholder collaboration.</p>	



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Target group:

The course is aimed for Ph D students with interest in management of marine resources through development of sustainable food production from the sea. The course will include lectures; student oral presentations; intensive group studies in collaborative team projects; and study visits to aquaculture sites. The course will be taught by international and local experts.

Location and time:

The on-site part of the course was given first time in the fall of 2017 at Sven Lovén Center Kristineberg and Tjärnö, GU, Sweden. The course is planned to be given every other year at New England, Portland, Maine, USA and every other year at SLC, SWEDEN. The next course will be held at UNE, Maine in the fall of 2018.

Course costs:

The course, including the study visits, boat trips, accommodation and meals, are aimed to be funded from external sources and therefore free of charge for the students. The students will need to cover their own travel costs.

Course credits:

The course is recommended to correspond to 4 ECTS (4 HP) in total. Constituting preparatory and concluding literature studies at a distance, and one week of intensive studies, on site, at SLC Kristineberg and Tjärnö or at UNE, Portland, Maine. The students is expected to perform literature reviews which should be summarized in a report and presented orally at seminars during the course. Seminars will also be held to put the lectures in perspective and to combine the information from different sections into a more general context as well as providing an opportunity to discuss issues in more detail.

Course organisation:

Departments in charge are: SWEMARC including Department of Biological and Environmental Sciences, Marine Sciences, Law, Business and administration and Academy of Design and Crafts and University at GU and Department of Marine Sciences and Center for excellence in Marine Sciences at University of New England, Portland, Maine, USA.

Course organizers, Kristina Snuttan Sundell and Barry Costa Pierce

Co-financing: The Royal Swedish Academy of Science and NSF IRES, USA

Course teachers (suggested selection):

Kristina Snuttan Sundell, SWEMARC, Dept. Bioenv, GU

Barry Costa Pierce, SWEMARC and Dept. Marine Sci., UNE

Maria Nyström - Academy of Design and Crafts, GU

David Langlet – Dept. of Law GU

Mats Lindegarth - Dept. of Marine Sciences, GU

Lena Mossberg - Dept. Business and Administration, GU

Glenn Page, President/CEO of SustainaMetrix, USA, and Centre for Environmental Change and Human Resilience, University of Dundee, SCOTLAND

Youngqi Lou - Dean & Professor at College of Design and Innovation, Tongji University, China and other SWEMARC professors and researchers



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Examination teachers: Kristina Snuttan Sundell, Maria Nyström and David Langlet