



GÖTEBORGS UNIVERSITET

## Innovative systems for sustainable marine aquaculture, 4 ETC

Course period: 12 Oct - 16 Oct 2015	Last day for application: 2015-08-15
Main location of the course: SLC Tjärnö	
Course leader/Address for applications: Anette Ungfors / <a href="mailto:anette.ungfors@gu.se">anette.ungfors@gu.se</a> & Åsa Strand/ <a href="mailto:asa.strand@gu.se">asa.strand@gu.se</a>	
<p>Course description (Advertisement for Ph.D. students):</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 nutrient pollution, biological pollution, invasive species and the use of wild fish for fishmeal and fish oil production.</p> <p><b>Aim of the course</b> This PhD course, jointly hosted by the department of Biology and Environmental Science and the Department for Marine Science, will highlight innovative solutions to the aquaculture related problems that society and the sector are facing by addressing new technical and biological alternatives.</p> <p><b>Target group</b> The course is especially aimed for biologists that want to develop their skills in new, innovative, sustainable aquaculture production systems, with focus on both biological and technical solutions. The course contains a mixture of theory, group discussions and study visits. The course will be taught by local and international experts. Focus will be on different fields of aquaculture such as environmental impact, spatial planning, sustainable feeds, genetics, welfare and diseases, as well as both land based and sea based production systems. Both fed and extractive aquaculture will be addressed.</p> <p><b>Location and time</b> Preparatory literature studies will run from August to start of the on-site course September 28. The on-site part of the course will be held at SLC Tjärnö on the Swedish West Coast (near Strömstad), starting with registration on Sunday September 27 and ending October 2<sup>nd</sup>. Tjärnö is located approximately 160 kilometers north of Gothenburg and 130 kilometers south of Oslo in Norway. More information about the research station is available at the SLC webpage: <a href="http://loven.gu.se/english/stations/tjarno">http://loven.gu.se/english/stations/tjarno</a></p> <p><b>Course costs</b> The course, including a study trip by boat, accommodation and meals, are free of charge but students will need to cover their own travel costs.</p> <p><b>Credit points</b> The course is recommended to correspond to 4 ECTS, (4 HP) in total. Constituting a preparatory literature study at a distance and one week of intense studies, on site, at SLC Tjärnö. The preparatory work will be individually presented (written and orally) and subjected to examination on scheduled occasions during the residential part at Tjärnö.</p>	



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Responsible department and other participating departments/organisations:

Course organisers: Drs. Åsa Strand and Anette Ungfors, Department of Marine Sciences and Prof. Kristina Snuttan Sundell, Department of Biological and Environmental Sciences.

Co-financing: The Royal Swedish Academy of Science

### External teachers

- 1) Max Troell – The Beijer Institute of Ecological Economics, Stockholm, Sweden.
- 2) Torsten Wik - Chalmers, Sweden.
- 3) Bendik Terjesen - NOFIMA, Norway.
- 4) Solveig van Nes - Bellona, Norway.
- 5) Jens Kjerulf Petersen - DTU AQUA, National Institute of Aquatic Resources, Danish Shellfish Centre, Nykøbing Mors, Denmark.
- 6) Michele Stanley - SAMS, Scottish Marine Institute, Oban, UK.
- 7) Björn-Steinar Sæther - NOFIMA Tromsø, Norway.
- 8) Sigurd Handeland - UNI-research, Norwegian Veterinary Institute, Trondheim, Norway.
- 9) Ingrid Undeland - Chalmers, Sweden.
- 10) Mathilda Olstorpe - VegaFish AB/SLU, Sweden.

### Internal teachers

- 1) Anette Ungfors (course co-ordinator) - Dept. of Marine Sciences, GU, Sweden.
- 2) Åsa Strand (course co-ordinator) - Dept. of Marine Sciences, GU, Sweden.
- 3) Mats Lindegarth - Dept. of Marine Sciences, GU, Sweden.
- 4) Per Bergström - Dept. of Marine Sciences, GU, Sweden.
- 5) Anders Stigebrandt - Dept. of Marine Sciences, GU, Sweden.
- 6) Per Nilsson - Dept. of Marine Sciences, GU, Sweden.
- 7) Alyssa Joyce - Dept. of Marine Sciences, GU, Sweden.
- 8) Gunilla Toth - Dept. of Marine Sciences, GU, Sweden.
- 9) Kristina Snuttan Sundell - Dept. of Biological and Environmental Sciences, GU, Sweden.
- 10) Erik Selander - Dept. of Marine Sciences, GU, Sweden.
- 11) Albin Gräns - Dept. of Biological and Environmental Sciences, GU, Sweden.
- 12) Henrik Sundh - Dept. of Biological and Environmental Sciences, GU, Sweden.

(Some of the teachers are yet to be confirmed)

Examiner: Kristina Snuttan Sundell



# GÖTEBORGS UNIVERSITET

Faculty of Science

Department of Biological and Environmental Sciences and Department of Marine Sciences

## **Innovative systems for sustainable marine aquaculture, 4 ETC**

*Third cycle education*

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### **1. Confirmation**

The syllabus was confirmed by the Head of the Department of Biological and Environmental Sciences 2015-XX-XX”

The course plan is valid from 2015-XX-XX.

Disciplinary domain: Science

Department in charge: Department of Biological and Environmental Sciences and Department of Marine Sciences

Main field of study: 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. Master students will be admitted as far as space allows.

### **4. Course content**

The course contains a mixture of lectures, group discussions and practical demonstrations. The lectures will cover issues faced by the aquaculture sector and methods to overcome these issues by addressing both technical and biological topics such as environmental impact, spatial planning, sustainable feeds, genetics, welfare and diseases, as well as both land based and sea based production systems. 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. Practical demonstrations and the study trip will deepen the theoretical aspects of the lectures, allowing the course participants to get a



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more thorough understanding of the possibilities, obstacles and drawbacks of the discussed systems.

### **5. Outcomes**

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

#### **1. Knowledge and understanding**

Describe problems and bottlenecks facing the aquaculture sector today and new technical solutions and methods to overcome these issues, as well as pros and cons with each method.

#### **2. Skills and abilities**

Independently and critically analyze and synthesize knowledge on a specific topic found in scientific literature and present this in group meetings.

Network with other scientists within the field.

#### **3. Judgement and approach**

To critically evaluate different culture 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 prepare themselves and read the assigned literature before attending the lectures at Tjärnö.

### **7. Assessment**

All course activities (lectures, practical demonstrations, seminars, report and oral presentation) are compulsory. Each student should perform an independent literature review of a topic connected to any of the proposed lectures. The review should be summarized as a report (approximately 3-5 pages) including a description of the topic and the connection of the topic to the student's own research or why the topic is of special interest to the student, and should be submitted to the course coordinators one week before the scheduled events at Tjärnö. Each student should orally present the produced report (15 minutes presentation, 5 minutes question) at seminars during the course, preferably using visual aids such as power point. The examination is based partly on the written report and partly on the oral presentation performed by each student. 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 cases where a 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 survey. The results and possible changes in the course will be shared with the students who participated in the evaluation and to those who are beginning the course.

### **10. Language of instruction**

The language of instruction is English.