

# Ansökan om medel för fakultetsgemensam forskarutbildningskurs 2019

Application for funding of faculty common course 2019

Kursnamn på svenska Hållbarhet inom naturvetenskap och teknik  
Swedish course title

Kursnamn på engelska Sustainability in Science and Technology  
English course title

Omfattning (högskolepoäng) 4  
Higher education credits

Undervisningsspråk English  
Language of instruction

Rekommenderade förkunskaper  
Recommended prerequisites  
Ph.D. student in Science, Technology and Engineering

## Kursens syfte och mål

General course objective/s and learning outcomes

To give basic and in-depth understanding of sustainability and how it crystalized in the past decades to well-formulated global goals: the Paris Agreement and UNSDG of 2016. To engage the participants in current and future issues facing science and technology to form and achieve sustainable societies: WHAT is sustainability; WHY it is needed for socio-economic-environment transformation; and HOW to achieve sustainable societies.

To explain the Role of science and technology to resolve the inextricable multilayered interactions in water, energy and natural resources, on the one hand, and the involved trans-sectorial and trans-disciplinary "socio-economic-environment" synergies for achieving sustainable societies on the other hand. This said, Ph.D. researchers in science, technology and engineering will: (1) acquire introductory & basic knowledge on sustainability, where system operation, optimization, material & product lifecycles are essential features; (2) attain a global overview on large-scale and long-term issues of sustainable management of water, energy & natural resources in socio-economic-environment perspective; (3) contribute and engage in high-level discussions in the progress and advance of Sustainability in Science and Technology not only for the Faculty but also for the society and higher education in general, and Uppsala University and Uppsala City in particular. In this context knowhow will be gained on how to couple science, technology and engineering to various societal and market sectors on several levels.

## Kursinnehåll

Course contents

Introduction. The course content given here is a comprehensive update based on the recommendations and suggestions of the Evaluation of the first version of the course "Sustainability in Science & Technology: Water, Energy & Natural Resources Nexus" that was given in two parts in Spring 2018 (February/March and May). This update will strengthen and enrich the Objectives and Learning Outcomes of the Course where its, multidisciplinary and multi-sectorial, nature involves stronger and wider coupling of "Science and Technology" to the global "Socio-Economic-Environment" aspects of Sustainability.

The Course Content. Understanding and inventing sustainable synergies for coupling science, technology and engineering of water, energy & natural resources to the "socio-economic-environment" infrastructures of responsible societies.

What is sustainability: pillars; concepts; UN-SDGs & Paris Agreement, with general background on the shortcomings of existing management systems and policies:

- (1) socio-economic-environment systems and existing synergies
- (2) life-cycles of water, energy, natural resources and existing impacts
- (3) processes/interaction of environment-climatic systems and existing impacts
- (4) bio-diversity, food and ecosystems services and existing degradation
- (5) eco- and environmental economy and existing weaknesses

Why sustainability:

- (1) constrains and peaks "Supply/Production/Demand" of natural resources
- (2) man-made versus natural threats (global warming and waste/pollution pile-up)
- (3) nexuses in water, energy and natural resource (security & conflict challenges)
- (4) over-population, poverty, education, health, natural resources food constrains
- (5) short-comings of rural-urban management versus "ecosystems-water-energy"

How to achieve sustainability:

- (1) transformation from fossil-energy to renewables
- (2) circular economy: fossil resources and responsible resource management
- (3) models and assessment of complex systems, monitoring, ICT-automation
- (4) assessment and management of sustainability "Key Performance Indicators"
- (5) coupling of "science & technology" to "social, economic & environment" sectors

## Undervisning (kursens uppläggnig)

Instruction (course structure)

Lectures, seminars and assignments supported by case-studies and study visits.

## Examination

Assessment (form of examination)

Participation in course: lectures (80%), seminars/assignments (100%)

Huvudansvarig institution Department of Physics and Astronomy

Department with main responsibility

## Kontaktperson/er (namn, e-postadress)

Contact person (name, e-mail address)

Farid El-Daoushy, [farid.el-daoushy@physics.uu.se](mailto:farid.el-daoushy@physics.uu.se)

Kurs datum/period Autumn 2019 (October/November 2019)

Course dates/period

## Antal platser 30

Maximum number of participants

## Anmälan om antagning till kursen ska skickas till

Application for admission to the course is to be sent to

[farid.el-daoushy@physics.uu.se](mailto:farid.el-daoushy@physics.uu.se)

Skicka anmälan senast 10th of October 2019

Submit application not later than