

Course-PM for MJ2659 Technology and ecosystems, Larger Course 7.5 credits

This course PM (course memo) is valid for the KTH course MJ2659 Technology and ecosystems (larger course) taught during study period 1 and 2, autumn 2021 (2021-08-30 – 2022-01-17). Please be aware that the information will be continuously updated. For the latest version, see the course page in Canvas.

The course will provide knowledge about natural resources and environmental consequences from technical systems, technical processes and human behavior in society.

Content and learning objectives

Course content *

- Concepts such as ecosystems, ecosystem services, ecological carrying capacity and planetary boundaries as well as their relation to technical development, population growth, welfare and sustainable development.
- The most important global and regional environmental problems of today such as global warming, acidification, eutrophication, ozone layer depletion, environmental pollutants, biodiversity, freshwater scarcity and deforestation.
- Trends and changes around the use of natural resources such as forest, soil and drinking water.
- Analysis of a socio-technical system, e.g. production and use of energy, transports, foods, electronics and textiles and its dependence as well as influence on ecosystems.
- Which role societal actors at different levels, e.g. individuals, companies, organisations and public authorities, play in relation to regional and global environmental problems and possible solutions.

Intended learning outcomes *

The overall aim of the course is to study the connection between ecosystems and socio-technical systems; how the socio-technical systems are dependent on functioning ecosystems at the same time as human use of natural resources influences structures and processes in the ecosystems.

On completion of the course, the student should be able to:

- Account for central concepts in ecosystem ecology.
- Describe and explain the most important global and regional environmental problems of today, different actors' contributions to the problems as well as the development of the problems over time.
- Given a global or regional environmental problem, identify and assess possible measures for improvement.

- Discuss consequences for the interpretation of sustainable development based on the concept ecological carrying capacity.
- Define a socio-technical system with relevant system boundaries as well as identify and analyse the environmental impact associated with the system and potential improvement measures.
- In writing and orally present literature and project assignment according to established scientific methodology as well as compare scientific and popular science written communication in the environmental context.

Learning activities

The course consists of lectures, literature assignment, project assignment and written examination. The literature assignment and project assignment require submission of analysis/reports as well as active participation in seminars. The literature assignment is individual and consists of a written book analysis and formulation of questions for discussion. The project work, which is divided into an individual part and a group work part, is based on the concept of planetary boundaries that are studied in relation to a specific socio-technical system.

Language of instruction

The course is taught in English.

Detailed Schedule

The course lectures (see schedule below) cover some of the main topics of the course and are mainly thought to be a complement to the course literature. For recommended readings prior to the lectures, see the schedule below or the detailed schedule in Canvas.

Due to the Covid-19 pandemic, the lectures this year will be held via Zoom. More information and links will be available in Canvas.

The course introduction is held 31 August 2021 at 13:15 via Zoom:

<https://kth-se.zoom.us/j/64853973469>

The table below shows the preliminary schedule. For the latest schedule, always check the schedule in Canvas.

Table 1. Preliminary schedule of the course, autumn 2021.

Day	Date	Time*	Activity	Room	Contents	Lecturer**	Literature***
Tue	31-aug	13-15	Lecture	Zoom	Course Introduction	MS, AP	1-5
Wed	01-sep	8-10	Lecture	Zoom	Energy	CS	14-15, 18-19
Tue	07-sep	13-15	Seminar	tba	Project intro/start Group A (Mandatory)	MS, AP	
Wed	08-sep	08-10	Seminar	tba	Project intro/start Group B (Mandatory)	MS, AP	
Thu	09-sep	10-11	Workshop	Zoom	References search	IJ, AS	
Mon	13-sep	10-12	Lecture	Zoom	Biodiversity	UM	6
Tue	21-sep	13-15	Project meeting	tba	Project supervision 1 Group 1-5 (Mandatory)	MS, AP	
Wed	22-sep	08-10	Project meeting	tba	Project supervision 1 Group 6-10 (Mandatory)	MS, AP	
Fr	24-sep	10-12	Lecture	Zoom	Transports	JÅ	(14),23
Fri	1oct	10-12	Lecture	Zoom	Global Water Cycle	FJ	10
Tue	5oct	13-15	Seminar	tba	Literature sem Group A (Mandatory)	AP	
Wed	6oct	08-10	Seminar	tba	Literature sem Group B (Mandatory)	AP	
Tue	12oct	13-15	Lecture	Zoom	Food production	RM	(11),12,(13)
Tue	02-nov	13-15	Lecture	Zoom	Ecotoxicology	FG	17,19,20,22
Frid	05-nov	13-15	Seminar	tba	Project start part 2 Group A (Mandatory)	MS, AP	
Frid	05-nov	15-17	Seminar	tba	Project start part 2 Group B (Mandatory)	MS, AP	
Tue	09-nov	14-16	Lecture	Zoom	Waste Management	MO	21
Frid	12-nov	13-15	Lecture	Zoom	Ecosystem services	CH	6,7
Fri	19-nov	10-12	Project meeting	tba	Project supervision 2 Group 1-5 (Mandatory)	MS, AP	
Fri	19-nov	13-15	Project meeting	tba	Project supervision 2 Group 6-10 (Mandatory)	MS, AP	
Frid	10-dec	08-12	Seminar	tba	Project final seminar Group 1-5 (Mandatory)	MS, AP	
Frid	10-dec	13-15	Seminar	tba	Project final seminar Group 6-10 (Mandatory)	MS, AP	
Thu	13-jan	14-18	Exam		Examination		
*Lecture and seminars starts 15 min past (8.15, 10.15 etc)							
**Magnus Svensson (MS), Asterios Papageorgiou (AP), Cecilia Sundberg (CS), Fernando Jaramillo (FJ), Fredrik Gröndahl (FG), Ulla Mörtberg (UM), Monika Olsson (MO), Cecilia Håkansson (CH), Jonas Åkerman (JÅ), Rebecka Milestad (RM), Ika Jorum (IJ), Annika Stengard (AS)							
*** Suggested chapters in Wright & Boorse (2013) to read prior to lecture							

Key concepts

Försurning	Acidification
Biologisk mångfald	Biodiversity
Ekologisk bärkraft	Carrying capacity
Avskogning	Deforestation
Ekosystem	Ecosystems
Ekosystemtjänster	Ecosystem services
Miljögifter	Environmental pollutants
Energi	Energy
Eutrofiering	Eutrophication
Vattenbrist	Freshwater scarcity
Global uppvärmning	Global warming
Globala miljöproblem	Global environmental problems
Naturresurser	Natural resources
Uttunning av ozonskiktet	Ozone layer depletion
Planetära gränser	Planetary boundaries
Befolkningstillväxt	Population growth
Regionala miljöproblem	Regional environmental problems
Sociotekniska system	Socio-technical systems
Hållbarhet	Sustainability
Hållbar utveckling	Sustainable development
Teknisk utveckling	Technical development
Välfärd	Welfare

Literature and preparations

Specific prerequisites *

Open to KTHs degree programme students with at least 150 credits or a Degree of Bachelor for the other applicant.

Courses from Upper Secondary School corresponding to the courses Eng B/6 according to the Swedish upper secondary school system.

Course literature

The two course books:

- Environmental Science Pearson New International Edition: Towards a Sustainable Future. 12th ed., 2013. Richard T. Wright and Dorothy F. Boorse, Gordon College. Pearson Education International, USA.
- Rockström, J. & Klum, M., 2012. The human quest: prospering within planetary boundaries. Stockholm: Bokförlaget Lagenskiöld.

Any additional literature will be made available via **Canvas**.

Support for students with disability

If you have a disability, you can get support via Funka:

<https://www.kth.se/student/studentliv/funktionsnedsattning>. Also, inform the course coordinator if you have special needs (Funka does not inform the course coordinator). Then show a certificate from Funka.

Examination and completion

Grading scale

This is a second cycle course (advanced level), comprising 7.5 credits (ECTS) (3,5 credits in study period 1 and 4 credits in study period 2), corresponding to 5 weeks' worth of full-time studies (about 200 h).

Grading scale: A, B, C, D, E, Fx, F

The grade Fx indicates that the result is close to pass, and that you need to supplement your assignment and resubmit within six weeks. Fx may be supplemented to grade E or P. The grade Fx cannot be used as a final grade for courses.

Examination *

- **LIT1** - Literature Assignment, 1.0 credits, grading scale: P, F
- **PRO1** - Project 1, 2.0 credits, grading scale: P, F
- **PRO2** - Project 2, 1.5 credits, grading scale: P, F
- **TEN1** - Examination, 3.0 credits, grading scale: A, B, C, D, E, Fx, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Examiner

[Fredrik Gröndahl](#)

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.

Goal-related grading criteria / assessment criteria

In order to pass the course, you must:

- pass a literature assignment (written book analysis + seminar) (LIT1);
- pass project work part 1 (analysis of the impact of a socio-technical system in relation to a set of planetary boundaries) (PRO1);
- pass project work part 2 (analysis of the impact of a socio-technical system in relation to one planetary boundary + seminar) (PRO2); and
- pass a written examination (TEN1).

Table 1 presents which examination (LIT1, PRO1, PRO2, TEN1) addresses which intended learning outcome. Connected to each examination is an assessment template that directs the marking of the submission in question. The assessment templates can also be used by the students as guides and support when conducting the different tasks.

Table 2. Intended learning outcomes, examinations and respective grade levels.

Intended learning outcome	Examined at level	LIT1	PRO1	PRO2	TEN1
1. Account for central concepts in ecosystem ecology	C-E				C-E
2. Describe and explain the most important global and regional environmental problems of today, different actors' contributions to the problems as well as the development of the problems over time.	A-E	P/F	P/F	P/F	A-E
3. Given a global or regional environmental problem, identify and assess possible measures for improvement.	A-E			P/F	A-E
4. Discuss consequences for the interpretation of sustainable development based on the concept ecological carrying capacity.	P/F	P/F			
5. Define a socio-technical system with relevant system boundaries as well as identify and analyse the environmental impact associated with the system and potential improvement measures.	P/F		P/F	P/F	
6. In writing and orally present literature and project assignment according to established scientific methodology as well as compare scientific and popular science written communication in the environmental context.	P/F	P/F	P/F	P/F	

Pass with distinction (LIT1 & PRO1)

The course grade is based on the written examination. However, if the student has exceeded expectations in relation to one or both of the two individual examinations (LIT1 and PRO1), there is the possibility to improve the course grade by up to two levels, according to Table 2. For more information on how to receive pass with distinction, see sections below. Please note that it is not necessary to have received passed with distinction on any of the individual examinations in order to receive a certain course grade (i.e. the student can receive any course grade based on the written examination), and that it is not possible to receive a course grade lower than the grade awarded for the written examination (TEN1).

The mark pass with distinction is only valid within the same course round (including the associated re-examination) as when it was awarded. Should the student finalise LIT1 and/or PRO1 this year and TEN1 another year, or vice versa, a pass with distinction (P+) cannot be used to improve the course grade.

Table 3. How the marks for the different examinations are combined to create the course grade (final grade).

LIT1* (1 hp)	P+	P+	P	P	P+	P+	P	P	P+	P+	P	P	P+	P+	P	P	P+	P+	P	P
PRO1* (2 hp)	P+	P	P+	P	P+	P	P+	P	P+	P	P+	P	P+	P	P+	P	P+	P	P+	P
PRO2 (1,5 hp)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
TEN1 (3 hp)	A	A	A	A	B	B	B	B	C	C	C	C	D	D	D	D	E	E	E	E
COURSE GRADE	A	A	A	A	A	A	A	B	A	B	B	C	B	C	C	D	C	D	D	E

Examination details

Literature assignment (LIT1)

The literature assignment (LIT1) consists of an individual task and comprises a written book analysis, formulation of questions for discussion, reading two supplementary texts available online, and the active participation during a seminar. More detailed instructions are available in the Literature assignment PM. The official mark is pass/fail, but a significantly strong submission can be awarded a pass with distinction (P+), which can improve the overall course grade according to the conditions described in the section Pass with distinction (LIT1 & PRO1). A detailed assessment template is available in the Literature assignment PM.

In order to receive a pass with distinction (P+) for this task, at least four (4) of the criteria need to have been marked as such. It is only possible to receive a pass with distinction (P+) for the initial submission, which must be submitted on time. In case the initial submission is late and/or is marked as Fx (i.e. one or more criteria is marked Fx) and needs to be supplemented, it is only possible to receive a pass (P), even if the original submission was marked with pass with distinction for ≥ 4 criteria.

Project (PRO1 + PRO2)

The project work is based on the concept of planetary boundaries. The article *Planetary Boundaries: Exploring the Safe Operating Space for Humanity* by Johan Rockström and colleagues (2009) and the book *The Human Quest - Prospering within planetary boundaries* by Johan Rockström and Mattias Klum (2012) should be starting points for the project work where you, individually and together in a project group, will study the planetary boundaries in relation to a specific socio-technical system. The work process is divided in two phases, Project work part 1 (PRO1) and Project work part 2 (PRO2). More detailed instructions will be presented during the project initiation workshops and be made available in a project PM in Canvas.

Part 1 (PRO1)

Project part 1 (PRO1) consists of an individual task. The official mark is pass/fail, but a significantly strong submission can be awarded a pass with distinction (P+), which can improve the overall course grade according to the conditions described in the section Pass with distinction (LIT1 & PRO1). A detailed assessment template is included in the project PM in Canvas.

In order to receive a pass with distinction (P+) for this task, at least three (3) of the criteria need to have been marked as such. It is only possible to receive a pass with distinction (P+) for the initial submission, which must be submitted on time. In case the initial submission is late and/or is marked as Fx (i.e. one or more criteria is marked Fx) and needs to be supplemented, it is only possible to receive a pass (P), even if the original submission was marked with pass with distinction for ≥ 3 criteria.

Part 2 (PRO2)

Project part 2 (PRO2) consists of a group task. The mark is pass/fail (P/F). A detailed assessment template is included in the project PM in Canvas.

Written examination (TEN1)

The written examination ("salsskrivning") will mainly be based on the content of the two course books, Wright and Boorse (2013) and Rockström and Klum (2012), but may also be related to additional course literature, the lectures and the Project work. The examination is graded A-F. An assessment template for TEN1 is presented in Table 3. More information regarding the structure of the written exam will be presented during the course.

Table 1. Assessment template for written examination, defining criteria for grade levels E, C and A.

Intended learning outcome	E	C	A
1. Account for central concepts in ecosystem ecology	Name and briefly define/describe central concepts in ecosystem ecology. Give at least one relevant, and no irrelevant, example.	Describe how central concepts in ecosystem ecology relate to each other and to STS.	-
2. Describe and explain the most important global and regional environmental problems of today, different actors' contributions to the problems as well as the development of the problems over time.	Briefly describe the most important global and regional environmental problems of today. Give at least one relevant, and no irrelevant, example.	Explain the underlying processes/mechanisms behind the problems and the resulting environmental impacts (i.e. alteration of ecosystem functioning).	Critically discuss and analyse different actors' contributions to the problems.
3. Given a global or regional environmental problem, identify and assess possible measures for improvement.	Suggest ways to reduce the negative ecological impact (i.e. solutions).	Describe the solutions and motivate how they may address the problem.	Critically assess and discuss the potential of the solutions, including the risk of introducing additional/new negative impact(s), and suggest strategies for implementation.

The examination will take place on **13 January 2022**. Due to the ongoing COVID-19 pandemic, it is yet unknown whether the examination will take place on Campus or will be held online as a written home exam. More information will come as an announcement in Canvas. In case that the examination will be held online the exam questions will be available for a limited period of time (four hours), according to the time set aside in the official schedule.

It is essential that you remember to **register in advance** for the exam. You can register via the personal menu located at the top of the KTH website. Under *Services* (Manage my studies), select *Exam registration*. Under *Current education*, you then select *Results* for the course (Current or Uncompleted) and there you can register for the exam. If you do not have the opportunity to write an exam you have signed up for, remember to cancel the registration. See more [here](#) (KTH > Student at KTH > Before and during a course > Examination).

The online registration for the written exams given during exam period 2 opens **Tuesday November 30** and closes **Thursday December 16, 23:59 pm**. See more [here](#).

Opportunity to complete the requirements via supplementary examination

In case a submitted assignment (LIT1/PRO1/PRO2) does not meet the requirements as outlined in the task descriptions, each student/group can amend the text and re-submit within six weeks after the grade and feedback were announced. Should the text still not meet the requirements, the student/group will receive an “F” for the examination and will have to re-do the task during the next time the course is given in order to receive the associated credits and the final grade for the course.

In case a student cannot attend the literature seminar, he or she will have to do a supplementary assignment (a written analysis based on the literature). More information will be available in Canvas after the date of the seminar.

Completion of the course

After period 2, the course is over. The written re-examination (“omtent”) will be in April 2022.

Opportunity to raise a grade

Improving a grade on a course, i.e. undergoing a new examination to improve a pass grade you have already received, is allowed. If you wish to do this, you need to contact the education administration at kursexp@abe.kth.se.

Further information

Course registration

If you have been admitted to a course at KTH, you need to register via the web to indicate that you indeed intend to attend the course in question. Course registration is a prerequisite for your course results to be registered and for you to be awarded with any higher education credits you earn during the course, as well as to obtain your student aid (CSN). Moreover, registration is necessary in order to maintain access to Canvas.

You find the web registration function via *Manage my studies* under *Services* in the personal menu at the top of the kth.se website. The registration period for courses starting in study period 1 (such as this course) is open from **Thursday 26 August** until **Monday 6 September**. Please find more information [here](#) (KTH > Student at KTH > Before and during a course).

Learning platform

KTH uses the learning management system Canvas. In Canvas, you will find up to date information about the course, including the detailed course schedule and deadlines. This is also where you will upload your text submissions. It is important that you remember to register on the course in order to access the material. Please make sure to explore Canvas and familiarise with the content structure as soon as possible.

Note: Links to the teaching occasions in Zoom will be available in Canvas.

Course offered by

[ABE/Sustainability and Environmental Engineering](#)

Teachers

Course coordinator and teacher: Magnus Svensson (svensson@kth.se)

Course teacher: Asterios Papageorgiou (asterios@kth.se)

Communication with the teachers

We work at the Department of Sustainable Development, Environmental Science and Engineering (SEED), located at Teknikringen 10B. Please primarily turn to Magnus and Asterios with any questions.

Important: The course teachers will use the “Announcement” function in Canvas to post updates and information about the course. We recommend you to review your personal Canvas settings and make sure that you have activated the email notification to also receive an email when such announcements are posted.

Course evaluation

A course evaluation will be conducted using feedback from an appointed **course committee** and a Learning Experience Questionnaire (LEQ). If you have any comments during the course, please feel free to contact the course committee or the course coordinator.

Previous course analyses are available on the course [website](#).

References and plagiarism

Plagiarism means that you submit someone else's work or parts of someone else's work under your own name. This is, of course, not allowed. KTH takes very seriously on plagiarism as well as on the use of other unauthorized methods or tools in order to gain an advantage ("cheating").

Occasionally, plagiarism happens because the student does not have sufficient knowledge about how to reference the material he or she has used. In short, you need to include references to make it clear to the reader (or listener / viewer) where the information you present comes from, and whether it is reproduced as a direct quote (only for one or possibly a few sentences where the meaning would get lost if it was rephrased) or paraphrased (using your own words). When you write texts as part of your course work, it is very important that you are careful to indicate the sources of the information you present and clearly state what are your own and others opinions or explanations, respectively. In this course we use the so-called **Harvard system** for references. If you are unsure what this means, you can find links to guides in Canvas.

All submitted texts will be checked for plagiarism using the automated text-matching tool **URKUND**. In case of suspected plagiarism or other fraud, the examiner is obliged to report to the Head of KTH, who assesses whether the matter is to be raised by the Disciplinary Board. The board decides whether any further action is to be taken, and if so, may decide to grant the student a warning or expel him or her during a specified period of time.

You can find more information about reference management and recommendations for reference management software on the [KTH Library webpage](#). To read more about plagiarism, please refer to the KTH publication [Guiding students away from plagiarism](#) by Jude Carroll and Carl-Mikael Zetterling (2009) (the English version starts on page 86).

Regarding the COVID-19 pandemic

The teacher team is planning the course so that the teaching activities can take place in a safe manner. The lectures will be held online (via Zoom) and on campus seminars in smaller groups. The written exam will be conducted either online or on campus depending on the situation during the exam period. More information will come as an announcement in Canvas.

For the latest updates, always turn to the Swedish Public Health Agency and KTH:s webpage. Additional changes to the course structure might be necessary in the light of possible new developments and restrictions. Remember that you also have a personal responsibility to not spread the infection.