

## COURSE SYLLABUS

# Pathway Year Engineering, 60 credits

*Pathway Year Engineering, 60 högskolepoäng*

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<b>Course Code:</b> PYEF17	<b>Education Cycle:</b> Basic level
<b>Confirmed by:</b> Dean Nov 22, 2016	<b>Disciplinary domain:</b> The humanities (45%), natural sciences (25%), technology (25%) and social sciences (5%)
<b>Valid From:</b> Aug 28, 2017	<b>Subject group:</b>
<b>Version:</b> 1	<b>Specialised in:</b> GXX
<b>Reg number:</b> JUE 2017/457-313	

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### Intended Learning Outcomes (ILO)

On successful completion of the Pathway Semester course students will be able to:

Knowledge and understanding

1. understand the main content and essential details of English spoken at a relatively rapid pace, and in written English of various genres, and in more formal contexts
2. show basic knowledge of academic writing
3. plan and deliver a formal presentation in English
4. use a range of academic study techniques and language strategies
5. communicate in Swedish on a basic level.
6. participate in basic oral and written conversations in Swedish about familiar subjects
7. understand Swedish culture and society
8. display knowledge of elementary functions, including their basic properties
9. display knowledge of the concept of geometric sum and linear optimization
10. display knowledge of numerical methods to calculate integrals
11. display knowledge of the structure of the atom and the chemical bonding
12. demonstrate comprehension of some elementary acid-base and redox reactions and also of some of their applications
13. demonstrate comprehension of energy changes in chemical reactions
14. demonstrate knowledge of physical quantities and units

Skills and abilities

15. in oral and written production and interaction in English students will demonstrate the ability to present and discuss information accurately and clearly with some adaptation to purpose, recipient and situation
16. carry out effective research using a range of sources and to critically assess and evaluate these
17. participate actively in classroom activities and be able to perform a range of task both individually and in a group setting
18. participate in simple oral and written conversations in Swedish about familiar subjects

19. show an awareness of basic grammatical concepts in Swedish
20. be familiar with different aspects of Swedish society and culture
21. demonstrate ability to transform and simplify algebraic and trigonometric expressions
22. demonstrate skills of solving equations of various sorts
23. demonstrate skills of calculating derivatives and basic integrals for elementary functions
24. demonstrate ability to use derivatives in order to analyze the properties of a given function and to methodically solve optimization problems
25. demonstrate skills of using trigonometric formulas to solve problems for triangles
26. demonstrate skills of using integrals to solve geometrical problems
27. demonstrate ability to perform simple pH and stoichiometry calculations and also to interpret chemical formulas and the hazard classification and labelling of chemicals
28. demonstrate skills in using experimental methods and interpret the results in both physics and chemistry laboratories
29. demonstrate skills in solving motion problems in one dimension, using Newton's laws and conservation of energy
30. demonstrate skills in using the concepts of momentum, impulse, pressure, heat, temperature, electrostatic forces and fields in calculations
31. demonstrate skills in calculating current, voltage, potential and resistance in DC circuits
32. demonstrate skills in applying the special theory of relativity
33. demonstrate skills to interpret and carry out basic calculations in nuclear physics

#### Judgement and approach

34. self- and peer-reflection on the development of study and personal skills
35. critical evaluation of relevant information related to the different parts of the course.

### Contents

The Pathway Year Engineering course is a preparatory course for students who do not meet the level of required English, Mathematics, Physics and Chemistry for University studies in Sweden.

The purpose of the course is to provide English, Mathematics, Physics and Chemistry education corresponding to the Swedish upper secondary school courses English 6, Mathematics 3b and 3c, Physics 1 and Chemistry 1. The purpose is also to prepare students for Higher Education in Sweden by giving support in adjusting to the demands, challenges and expectations of Swedish Higher Education.

The course consists of seven sub courses; Preparatory English 2, Swedish 1 and Life, Studies 1, Pathway Mathematics 1, Pathway Mathematics 2, Pathway Chemistry and Pathway Physics.

#### Preparatory English 2, 20,0 credits

The course consists of lectures, seminars and group activities in various fields of academic English and has been designed specifically to meet the needs of non-native English speakers who wish to develop their English language competencies and be able to communicate effectively in an academic environment. In addition to the development of the four main areas of language (reading, writing, speaking and listening), there is also a strong focus on academic skills

including research ethics, critical thinking, academic writing and presentations. English will be taught in an international context with a strong focus on active participation and group discussion. Students will be given opportunities to share their own experiences and in turn gain a deeper knowledge of living conditions, social issues and cultural features in different parts of the world.

Course content and objectives include:

- Applied grammar (individualised)
- Vocabulary building - academic language. Both general and subject specific.
- Academic reading
- Listening comprehension
- Academic writing - summary writing, reports, essays
- Language strategies
- Oral proficiency - presentation skills, group discussion skills, pronunciation
- Introduction to rhetoric - the art of persuasive speaking and writing
- Novel Study & literary analysis

Swedish 1, 7,5 credits

The Swedish language will be taught aiming to give students basic Swedish language skills. This will better equip students to interact with and understand their new surroundings. The weekly language sessions contain grammar lectures, text reading, listening and reading comprehension, vocabulary and pronunciation. Written and oral exercises are given as part of the course. The mentoring session's aims to help monitoring and supporting the progress.

Course content and objectives include:

- Spoken communication such as exercises on oral conversations and presentations.
- Swedish pronunciation and prosody
- Reading and listening comprehension
- Simple texts and conversations focusing on everyday phrases
- Basic Swedish grammar and vocabulary

Life and Studies 1, 2,5 credits

The Life and Studies course aims to enable familiarity with Sweden. You will study and explore different aspects of Sweden such as politics, history, religion, governmental structure and traditions.

Course content and objectives include:

- Lectures (in English) on Swedish society and culture
- Study visits

Pathway Mathematics 1, 7,5 credits

The course includes the following elements:

- Basic algebra
- Geometric sums
- Studies of polynomial, power and exponential functions
- Derivatives, differentiation rules for the functions mentioned above
- Applications using the derivative to solve optimization problems

## - Integrals

Pathway Mathematics 2, 7,5 credits

The course includes the following elements:

- Basic algebra
- Elementary function theory
- Trigonometric formulas and identities
- Derivatives, differentiation rules
- Integrals, applications using integrals to solve geometrical problems

Pathway Chemistry, 6,0 credits

The course includes some basic chemical concepts about the structure and the functions of the matter, the transformations of the substances within chemical reactions and also the importance of Chemistry for people and societies.

The course includes the following elements:

- The risks at work in the laboratory together with labelling and handling of chemicals
- Matter and chemical bonding
- Chemical formulas and calculations
- Energy changings at chemical reactions
- Acids and bases
- Redox reactions and electrochemistry

Pathway Physics, 9,0 credits

The course introduces the basic physics and the science of working with experiments, analysis and interpretation of measurements using models. In addition, the course will provide familiarity with the use of mathematical concepts in physics and algebraic handling of formulas and expressions.

The course includes the following topics:

- Motion: speed, acceleration, laws of motion with constant acceleration
- Forces: Newton's laws of gravity, normal force, gravitational force, Hooke's Law, the friction force, inclined plane.
- Energy and work: kinetic energy, potential energy, power and efficiency, the energy principle
- Pressure: density, pressure in liquids and gases, Archimedes' law and gas laws
- Heat and temperature: heating and cooling, phase transitions and calorimetry
- Electricity: electric charges and forces and electric fields, electric current, voltage and potential, resistance and resistivity, electrical energy and power
- DC circuits: series and parallel connections of resistors and batteries
- Impulse and momentum: conservation of momentum, elastic and inelastic collisions
- Nuclear physics: nuclear reactions, activity and half-life, radioactive radiation
- Principle of relativity: light speed, time dilation and length contraction, relativistic energy.

## **Type of instruction**

Lectures, seminars, group discussions, laboratory exercises, study visits as well as mentoring sessions.

Active participation required in lectures, assignments, laboratory exercises, seminars, group discussions and mentoring sessions is compulsory in order to meet the requirements of the course.

The teaching is conducted in English.

### Prerequisites

High School Diploma and English language skills corresponding to:

English 5/IELTS 5.5 (no part below 5.0) or equivalent,

Internet based TOEFL test 72, written test 17 or equivalent

Paper based TOEFL 530, written test 4 or equivalent

Mathematics 2a, 2b, 2c or the equivalent (or the equivalent) (or the equivalent).

### Examination and grades

The course is graded Fail (U) or Pass (G).

The examination consists of written and oral assignments, laboratory experiments and written exams.

The final grade of the course is issued only when all course units have been passed.

Registration of examination for the sub-course 'Preparatory English 2':

Name of the Test	Value	Grading
Written exam - Preparatory English 2 <sup>1</sup>	3 credits	U/G
Research project - Preparatory English 2 <sup>2</sup>	6 credits	U/G
Literature project - Preparatory English 2 <sup>3</sup>	5 credits	U/G
Academic essay and formal speech - Preparatory English 2 <sup>4</sup>	5 credits	U/G
Oral exam - Preparatory English 2 <sup>5</sup>	1 credits	U/G

<sup>1</sup> ILO1; ILO2; ILO4; ILO15

<sup>2</sup> ILO 1; ILO2; ILO3; ILO15; ILO16; ILO17; ILO34

<sup>3</sup> ILO 1; ILO 2; ILO15; ILO17; ILO35

<sup>4</sup> ILO2; ILO15; ILO16

<sup>5</sup> ILO1; ILO15; ILO17

Registration of examination for the sub-course 'Swedish 1':

Name of the Test	Value	Grading
Oral exam 1 - Swedish 1 <sup>1</sup>	1 credits	U/G
Oral exam 2 - Swedish 1 <sup>2</sup>	1 credits	U/G
Written exam 1 - Swedish 1 <sup>3</sup>	2.5 credits	U/G
Written exam 2 - Swedish 1 <sup>4</sup>	3 credits	U/G

<sup>1</sup> ILO5; ILO6; ILO19

<sup>2</sup> ILO5; ILO6; ILO19

<sup>3</sup> ILO6; ILO18; ILO19

<sup>4</sup> ILO6; ILO18; ILO19

Registration of examination for the sub-course 'Life and Studies 1':

Name of the Test	Value	Grading
Written exam - Life and Studies <sup>1</sup>	2.5 credits	U/G

<sup>1</sup> ILO7; ILO20

Registration of examination for the sub-course 'Pathway Mathematics 1':

Name of the Test	Value	Grading
Written exam - Pathway Mathematics 1 <sup>1</sup>	7.5 credits	U/G

<sup>1</sup> ILO8; ILO9; ILO21; ILO22; ILO23; ILO24; ILO25

Registration of examination for the sub-course 'Pathway Mathematics 2':

Name of the Test	Value	Grading
Written exam - Pathway Mathematics 2 <sup>1</sup>	7.5 credits	U/G

<sup>1</sup> ILO8; ILO10; ILO21; ILO22; ILO23; ILO26

Registration of examination for the sub-course 'Pathway Chemistry':

Name of the Test	Value	Grading
Written exam - Pathway Chemistry <sup>1</sup>	4 credits	U/G
Laborations and assignment - Pathway Chemistry <sup>2</sup>	2 credits	U/G

<sup>1</sup> ILO11; ILO12; ILO13; ILO27

<sup>2</sup> ILO12; ILO27; ILO28

Registration of examination for the sub-course 'Pathway Physics':

Name of the Test	Value	Grading
Written exam - Pathway Physics <sup>1</sup>	6 credits	U/G
Laborations and assignment - Pathway Physics <sup>2</sup>	3 credits	U/G

<sup>1</sup> ILO14; ILO29; ILO30; ILO31; ILO32; ILO33

<sup>2</sup> ILO14; ILO28

## Other information

### Qualification Requirements

To obtain the course certificate the student shall complete the course requirements of 60 credits. Active participation required in lectures, assignments, laboratory exercises, seminars, group discussions and mentoring sessions is compulsory in order to meet the requirements of the course.

**Continuation Requirements**

Students who successfully complete the Pathway Year Engineering, 60 credits may enter into, if preselected and eligibility assessed, the Bachelor programme Sustainable Supply Chain Management at JU without any further testing.

**Course literature**

McCarthy Michael & O'Dell Felicity, *Academic Vocabulary in Use*, Cambridge University Press  
ISBN: 9780521689397

Ken Paterson and Roberta Wedge, *Oxford Grammar for EAP - English Grammar and Practice for Academic Purposes*, OUP Oxford

Cottrell Stella, *The Study Skills Handbook*, Palgrave MacMillian

Contemporary novels and short stories

Rehnqvist, Gunilla, *Svenska för utländska studenter*, Studentlitteratur ISBN: 97891-4405-967-9

Handouts provided by JU