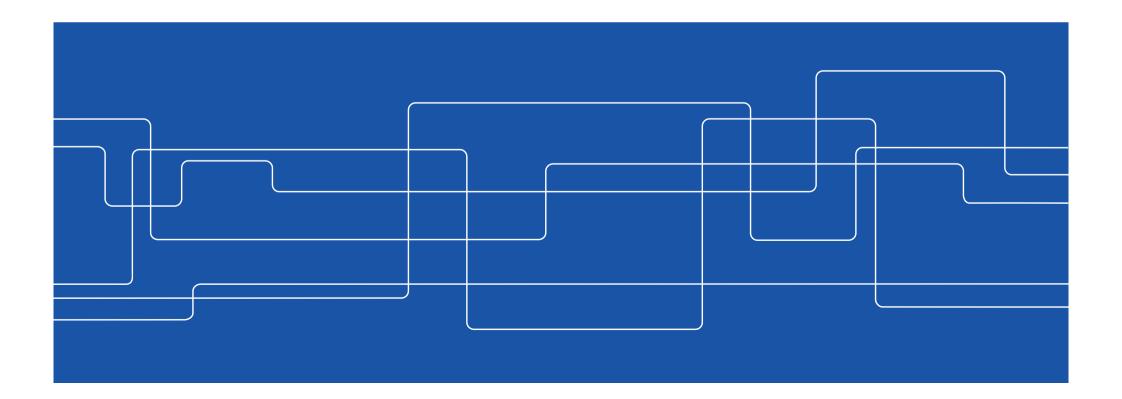


# Systems, Control and Robotics Program information meeting

2019-08-22 Petter Ögren





### Welcome meeting 22 August 2019

- Reminder of Important dates
- Who is who
- Program overview
- Courses
  - Academic year with periods
  - Curriculum and requirements
  - Course selection
- Thesis Project work
- Mixed Information
  - Plagiarism, Grading ...
- SCR team-challenge 2019



### **Reminder of Important Dates**

- No later than August 27
  - Complete study plan online form
  - Details:

https://www.kth.se/social/files/5d53c3e856be5bf1 3ce4302d/Handout%20for%20Master%20H19\_%2 0SN%20edit.pdf

Questions: ask: <u>clv@kth.se</u>

### Course selection

For Autumn term 2019: when you log in into your personal menu you will see the courses you have been admitted to. If you want to modify this course selection you will need to submit a Study Plan form (web form). You have to list <u>ALL</u> the courses you intend to take during period 1 and 2. <u>Latest on the 27th of August</u> your coordinator needs to have back your study plan form, if this is the case.

From Spring term 2020 on, you will select your courses online. There are two course selection periods, **1-15 November for the Spring term** and **1-15 May for the Fall term**. You sign up for the courses online at <a href="https://www.universityadmission.se">www.universityadmission.se</a>. Each term, before the course selection period, you will receive an email from your coordinator, with all needed information, as a reminder.



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# Master Program Director: Petter Ögren

- Professor at
  - Department of Robotics Perception and Learning (RPL)
  - School of Electrical Engineering and Computer Science (EECS)
- petter@kth.se
- Teknikringen 14, floor 7
- Email to make appointment





### **Co-Program director**

- Elling Jacobsen
- Professor in Automatic Control
- https://www.kth.se/profile/jacobsen/
- jacobsen@kth.se
- Osquldas väg 10, floor 6
- Email for appointment





### **Master Coordinator for SCR**

- Cristina La Verde
- Lindstedsvägen 3
- clv@kth.se







### Who are you?

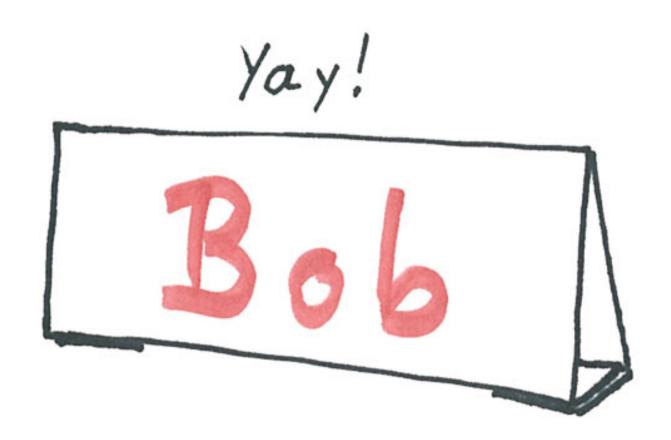
### Quick round of presentations

- Your name
- Where you come from (Country)





### Make a Nametag...





### Welcome meeting 22 August 2019

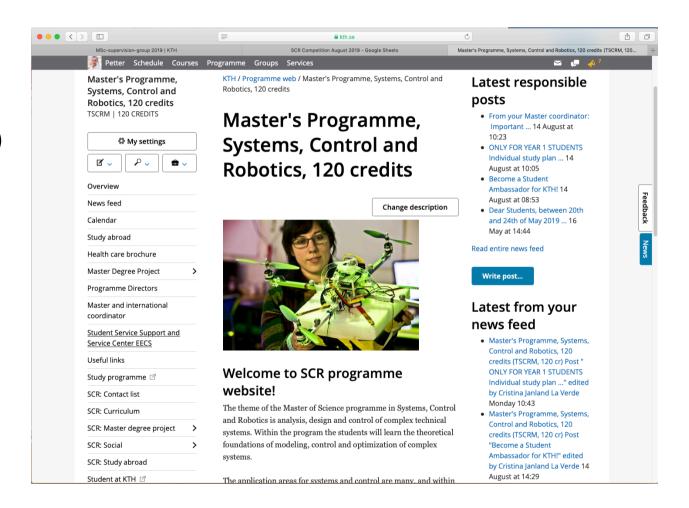
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### Program web page

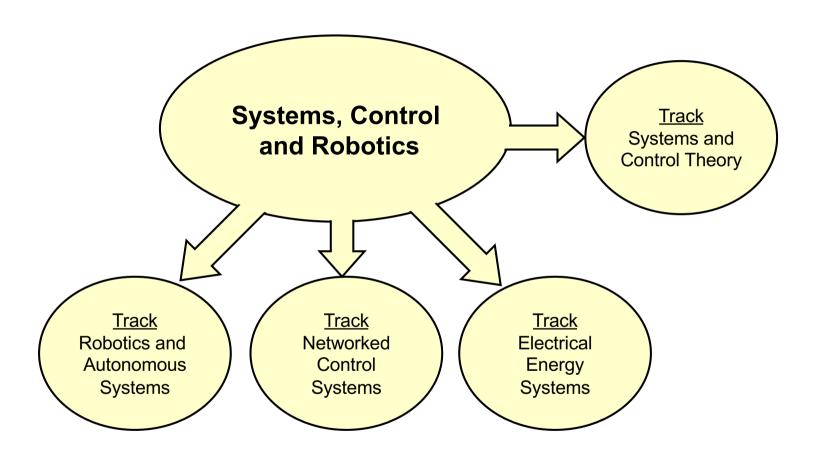
Go to kth.se
Log in (top right corner)
Click on Programme
You will see (or will see
when you are
registered)

Master's Programme, Systems, Control and Robotics, 120 credits (TSCRM, 120 cr)



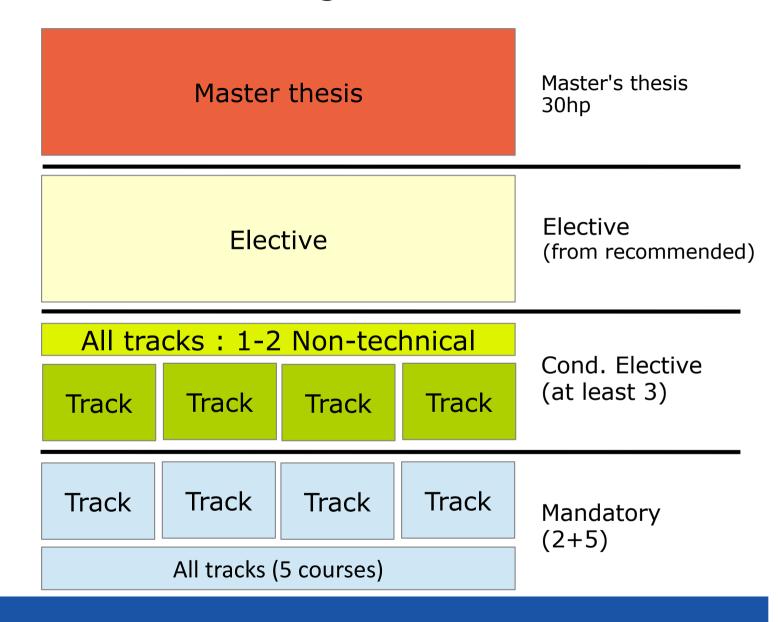


### **Program Overview**





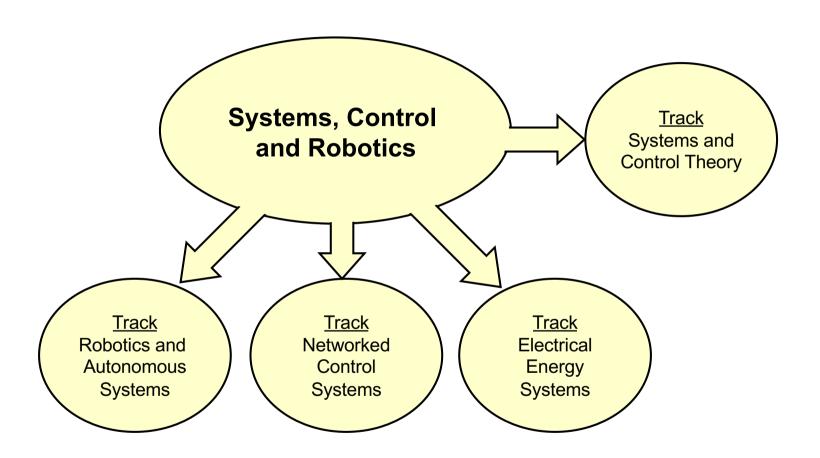
### **Structure of Program**



Freedom



### **Program Overview**





# **Handout of Track Descriptions**



### Track: Robotics and Autonomous Systems (Example)

Course ID	Name	When	Credits	Туре
EL2220	The Sustainable Systems and Control Engineer	Y1-Y2	3	Mandatory
Year 1				
EL2820	Modelling of Dynamical Systems	P1	7,5	Mandatory
DD2410	Introduction to Robotics	P1	7,5	Mandatory
DD2423	Image Analysis and Computer Vision	P2	7,5	Track mandatory
EL2320	Applied Estimation	P2	7,5	Track mandatory
DD2419	Project Course in Robotics and Autonomous Systems	P3-P4	9	Project course <b>and</b> Conditionally elective
EL2450	Hybrid and Embedded Control Sys.	P3	7,5	Conditionally elective
DD2421	Machine Learning	P3	7,5	Conditionally elective
EL2520	Control Theory and Practice, adv.	P4	7,5	Mandatory
Year 2				
AK2036	Theory and Methodology of Science	P1	7,5	Mandatory
DD2380	Artificial Intelligence	P1	6	Conditionally elective
XXYYYY	Non-Technical Course	P2	6-7.5	Mandatory
DD2434	Machine Learning, Adv. Course	P2	7,5	Recommended
XXYYYY	Master Thesis	P3-P4	30	Mandatory



### **Track: Systems and Control Theory (Example)**

Course ID	Name	When	Credits	Туре
EL2220	The Sustainable Systems and Control Engineer	Y1-Y2	3	Mandatory
Year 1				
EL2820	Modelling of Dynamical Systems	P1	7,5	Mandatory
DD2410	Introduction to Robotics	P1	7,5	Mandatory
EL2620	Nonlinear Control	P2	7,5	Track Mandatory
SF2832	Mathematical Systems Theory	P2	7,5	Conditionally Elective
XXYYYY	Non-Technical Course	P3	6	Mandatory
EL2450	Hybrid and Embedded Control Sys.	P3	7,5	Conditionally Elective
DD2424	Deep Learning in Data Science	P4	7,5	Recommended
EL2520	Control Theory and Practice, adv.	P4	7,5	Mandatory
Year 2				
AK2036	Theory and Methodology of Science	P1	7,5	Mandatory
EL2700	Model Predictive Control	P1	7,5	Track Mandatory
EL2425	Automatic Control, Project Course, Smaller Course	P2	7,5	Conditionally Elective (and Project Course)
EL2805	Reinforcement Learning	P2	7,5	Recommended
XXYYYY	Master Thesis	P3-P4	30	Mandatory



### **Track: Electrical Energy Systems (Example)**

Course ID	Name	When	Credits	Туре
EL2220	The Sustainable Systems and Control Engineer	Y1-Y2	3	Mandatory
Year 1				
EL2820	Modelling of Dynamical Systems	P1	7,5	Mandatory
EJ2301	Power Electronics	P1-P2	6	Conditionally Elective
EG2100	Power System Analysis	P1-P2	6	Track Mandatory
EH2741	Communication and Control in Electric Power Systems	P1-P2	6	Conditionally Elective
EL2620	Nonlinear Control	P2	7,5	Conditionally Elective
EL2450	Hybrid and Embedded Control Systems	P3	7,5	Track Mandatory
EG2110	Power System Stability and Control	P3	7,5	Conditionally Elective
EH2745	Computer Applications in Power Systems	P4	4,5	Conditionally Elective
EL2520	Control Theory and Practice, adv.	P4	7,5	Mandatory
Year 2				
AK2036	Theory and Methodology of Science	P1	7,5	Mandatory
DD2410	Introduction to Robotics	P1	7,5	Mandatory
EL2425	Automatic Control Project Course, Smaller Course	P2	7,5	Conditionally Elective (and Project Course)
XXYYYY	Non-Technical Course	P2	6	Mandatory
XXYYYY	Master Thesis	P3-P4	30	Mandatory

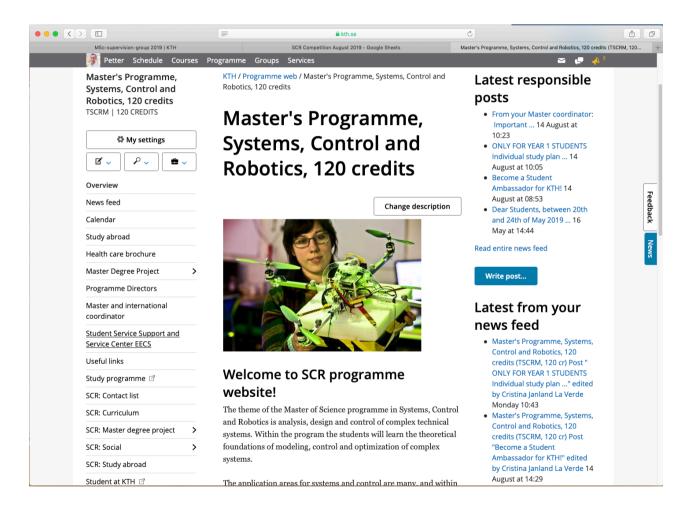


### **Track: Networked Control Systems (Example)**

Course ID	Name	When	Credits	Туре
EL2220	The Sustainable Systems and Control Engineer	Y1-Y2	3	Mandatory
Year 1				
EL2820	Modelling of Dynamical Systems	P1	7,5	Mandatory
DD2410	Introduction to Robotics	P1	7,5	Mandatory
EL2320	Applied Estimation	P2	7,5	Conditionally Elective
SF1811	Optimization	P2	6	Recommended
EL2450	Hybrid and Embedded control Systems	P3	7,5	Track Mandatory
EP2200	Queuing Theory and Teletraffic Systems	P3	7,5	Conditionally Elective
DD2424	Deep Learning in Data Science	P4	7,5	Conditionally Elective
EL2520	Control Theory and Practice, adv.	P4	7,5	Mandatory
Year 2				
AK2036	Theory and Methodology of Science	P1	7,5	Mandatory
EL2745	Principles of Wireless Sensor Networks	P1	7,5	Track Mandatory
XXYYYY	Non-Technical Course	P2	7,5	Mandatory
EL2425	Automatic Control Project Course, Smaller Course	P2	7,5	Conditionally Elective (and Project Course)
XXYYYY	Master Thesis	P3-P4	30	Mandatory



### More details on courses on website





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# **Academic year at KTH**

Today

First Exams

	Week	Мо	Tu	We	Th	Fr	Sa	Su
Aug	33	1/re	I/re	I/re	I/re	I/re	I/re	18 aug
3	2/	1/re	1/re	1/re		I/re	-	25 aug
	35	1	1	1	1	1	S	01 sep
Sep	36	1	1	1	1	1	S	08 sep
	37	1	1	1	1	1	S	15 sep
	38	1	1	1	1	1	S	22 sep
	39	1	1	1	1	1	S	29 sep
Oct	40	1	1	1	1	1	S	6 oct
	41	1	1	1	1	1	S	13 oct
	42	0	0	0	0	Е	Е	20 oct
	43	E	П	ш	щ	Е	S	27 oct
	44	2	2	2	2	2	Н	03 nov
Nov	45	2	2	2	2	2	S	10 nov
	46	2	2	2	2	2	S	17 nov
	47	2	2	2	2	2	S	24 nov
	48	2	2	2	2	2	S	01 dec
Dec	49	2	2	2	2	2	S	08 dec
	50	2	2	2	2	2	S	15 dec
	51	O/RE	O/RE	O/RE	O/RE	0	S	22 dec
	52	0	S	Н	Н	0	S	29 dec
Jan	1	0	S	Н	0	0	S	05 jan
	2	Н	Е	Ε	Е	Е	Е	12 jan

	Week	Мо	Tu	We	Th	Fr	Sa	Su
	3	Е	Е	3	3	3	S	19 jan
	4	3	3	3	3	3	S	26 jan
	5	3	3	3	3	3	S	02 feb
Feb	6	3	3	3	3	3	S	09 feb
ras	7	3	3	3	3	3	S	16 feb
							0	
	8	3	3	3	3	3	S	23 feb
	9	3	3	3	3	3	S	01 mar
Mar	10	3	3	0	0	0	Е	08 mar
	11	Е	Е	Е	Е	Е	Е	15 mar
	12	4	4	4	4	4	S	22 mar
	13	4	4	4	4	4	S	29 mar
Apr	14	4	4	4	4	4	S	05 apr
	15	4	4	4	4	Н	S	12 apr
	16	Н	O/RE	O/RE	O/RE	O/RE	S	19 apr
	17	4	4	4	4	4	S	26 apr
	18	4	4	4	4	Н	S	3 may
May	19	4	4	4	4	4	S	10 may
	20	4	4	4	4	4	S	17 may
	21	4	0	0	Н	0	S	24 may
1933/0	22	Е	Е	Ε	Е	Е	Е	31 may
Jun	23	Е	O/RE	O/RE	O/RE	O/RE	Н	07 jun

I Introductory weeks

H National Holiday

Exam and tuition free day

1-4 Scheduled day within study period

Examinations

RE Re-examinations

Own work



# Academic year with periods

### **Year divided into 2 semesters**

Autumn semester ("HT")
Spring semester ("VT")

### Each semester has 2 periods/quarters

Periods 1 + 2 = Autumn semester Periods 3 + 4 = Spring semester

### Each period about 8-9 weeks

7-8 for studies + 1 week for exams

### Most courses only run one period

Lots of new material in short time. Need to be alert all the time!



# Responsibility

# Requirements for Degree

The students must have completed

- all of the mandatory courses depending on track
- at least 3 conditionally elective technical courses depending on the chosen track
- one or two elective non-technical courses
- one project course in the subject area
- other recommended courses for a total of 90 higher education credits
- degree project of 30 higher education credits.



### Course selection

- Step 1
  - Choose track
  - (Track = predefined "package")
- Step 2
  - Select courses for that track
- Can I Change Track?
  - Yes
- Important: After 2 years, your courses must satisfy requirements of at least 1 track

Only in your head

Hand in form to Christina



### Course selection

Remember that some courses have **limited number of places** and then registering is especially important.

Note that some courses only run **every second** year (accelerated graduate program)

### **Course selection**

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# Understanding the course code

The courses have codes like EL2520 or DD2380

The first character tells what area, second what department/group

- E = Electrical engineering (EL = control)
- D = Computer science etc. (DD = computer science)

The first digit tells what level it is

- 1 basic ("bachelor")
- 2 advanced ("master")
- 3 doctoral ("phd")



## Note on AK2036 (Theory of science...)

You can take it either the first or the second **year**. Pick the one that fits you best.

For many tracks it **makes sense to take it the second year,** see track examples!

Also possible to take in any other period but some elements will be more adapted to other programs then.



### What Courses do I Choose?

- Fun
- Needed in Track
- makes Combined Schedule reasonable
- Is a prerequisite for future course



### Practical approach to courses

- Check out 4 example choices of the tracks (https://www.kth.se/social/program/tscrm/page/scrcurriculum/)
- 2. Pick one track
- 3. Look though all conditionally elective and recommended courses
- 4. Try to swap IN the ones you like and REMOVE ones you do not like



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EL2450	Hybrid and Embedded Control Sys.	P3	7,5	Conditionally elective
טט2421	Machine Learning	P3	7,5	Conditionally elective
EL2520	Control Theory and Practice, adv.	P4	7,5	Mandatory
Year 2				
AK2036	Theory and Methodology of Science	P1	7,5	Mandatory
טטע2380	Artificial Intelligence	P1	6	Conditionally elective
XXYYYY	Non-Technical Course	P2	6-7.5	Mandatory
DD2434	Machine Learning, Adv. Course	P2	7,5	Recommended
XXYYYY	Master Thesis	P3-P4	30	Mandatory

You can change these

and these



### Stick to the curriculum

If you go outside please ask me first

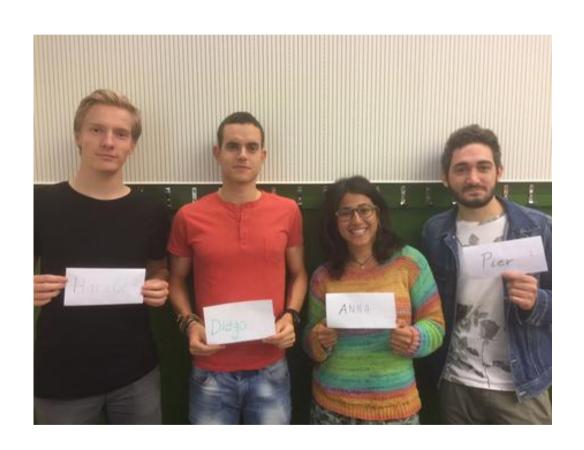
Prio1: Make sure that you finish the mandatory courses.

KTH restrictive on taking extra courses



### Have you finished writing your nametag?

- Find the people in your Team (next slide)
- Make someone take a group picture of you with your name tags showing
- Email the picture to <u>petter@kth.se</u> (will be posted online)
- → photo catalogue





# **Teams and Rooms for Challenge**

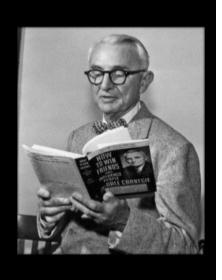
Room E34		Room E35		Room E36	
Team 1:		Team 5:		Team 9:	
YANG	SHAOHUI	HUMNE	ANKITA ARUN	QIAO	ZIHAN
ALLAN	MAURA	MOLINARI	MARCO	SARMIENTO GONZÁLEZ	LUIS ALEJANDRO
Lavebratt	Bill	BALARAM	SARADA	ELVARSDÓTTIR	HÓLMFRÍÐUR
Lin	Valentine	Modahl	Ylva	Hirsch	Daniel
Marstorp	Gustav	Nordén	Frans	Skoglund	Caroline
Ranjith	Adam	Persson	Frida	Larsson Forsberg	Albin
Team 2:		Team 6:		Team 10:	
CHITTEPU	YASWANTH	ZHANG	WANZHI	RUSTAMOV	JEYHUN
ZHANG	SHUBO	DE LIMA	OSCAR	JANSSON	MADELEINE
Gustavsson	Oscar	GUHA	ROUMEN	MARIOCORDIANO	FRANCESCO
Hemlin	Karl	Stadler	Karsten	Bonnevie	Rodrigue
Hestell	Filip	Steinholtz	Tim	Bui	Linda
Svensson	Olle	Svensson	Niclas	Corfitsen	Christian
Team 3:		Team 7:		Team 11:	
ALIYEV	TURAL	SAMPATH KUMAR	VARUN KUMAR	SHI	HAOXIANG
NGUYEN	DINH VINH THANH	MUHAMMAD ILYAS	MUHAMMAD ZAHID	MAHAJAN	AKANSHU
YING	ZAOSHI	Ahmadi	Seyedhesam	GHIGNONE	EDOARDO
Erlandsson	Oskar	Al-Janabi	Mustafa Ahmed Taha	Corneliussen	Ilian
Ghasemi	Hashem	Yap	Martti Lefika	Edlund	Joar
Greinsmark	Vidar	Vikgren	Mattias	Eriksson	Andreas
Team 4:		Team 8:		Team 12:	
KUMAR	MOHIT	VAZEERUDDIN	MOHAMMED ANAS	MAMBELLI	DAVIDE
COBLE	KYLE WILLIAM	SOUROULLA	TIMOTHEOS	SADASHIV	ARAVIND
DESHMUKH	SAVYARAJ RAVINDRA	VALLONE	ANDREA	SYAMIL	ABI RAHMAN
Melki	Jakob	Landin	Roman	Alkas Alias	Kildo
Miksits	Adam	Wilczek	Andrej Markus	Andersson	John
Mirzai	Badi	von Reis Marlevi	Filip	Bahmani	Mehrdad



### The Power of Names

"Remember that a person's name is to that person the sweetest and most important sound in any language".

- Dale Carnegie









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### Master thesis

Typically started in the 3<sup>rd</sup> quarter of the second year

Need 60 credits in completed courses at least to start

This is where you put everything you learned to use

Where? in industry, at a KTH department or at other technical university or research institute

Your responsibility to find one

Need a **supervisor and examiner at KTH** and a local supervisor if you are outside KTH.



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## Reading/writing and Plagarism

- Technical reading and writing skills very important
- Word by word copying is a big NO-NO
- Use your own words or use quotes and references.
- Do not share your solutions with others
- It might not be explicitly stated but these rules are assumed
- If you are caught you will be reported and can get suspended

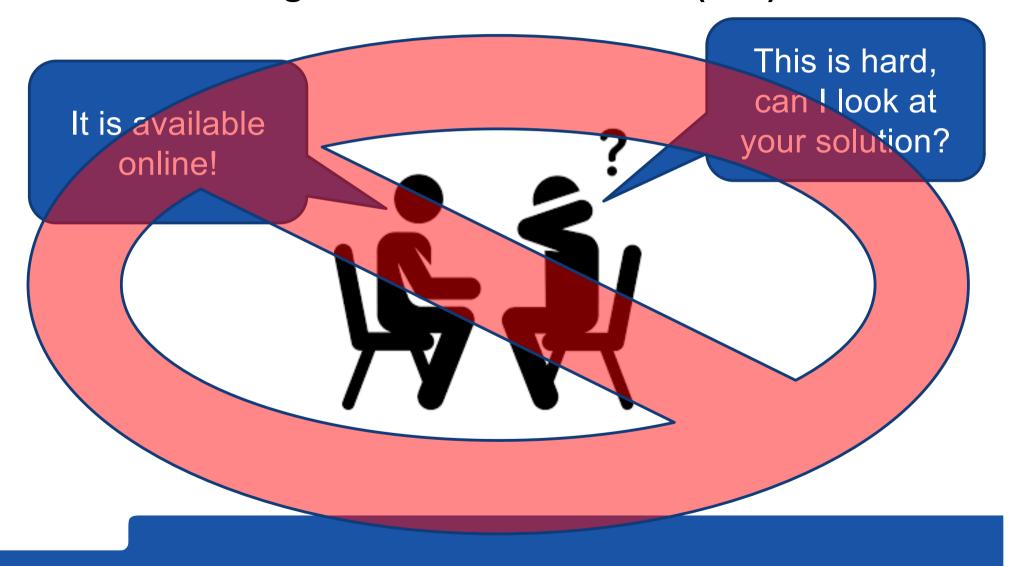


## Word by word copying for a report (No!)





## **Sharing solutions with others (No!)**



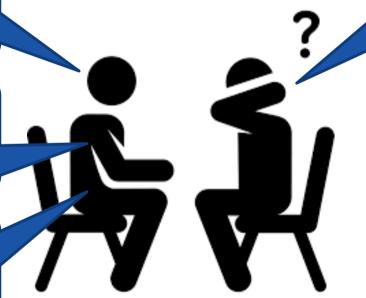


## **Sharing understanding with others (Yes!)**

What part is hard?

Try reading Ch3 in the book!

I can explain the algorithm on page 25 to you



This is hard, can I look at your solution?



## Code of Honour

- When studying at this level you will be given a lot of freedom.
- With freedom comes responsibility
- Think about this when working on homework assignments, projects, etc
- EECS Code of Honor
  - https://www.kth.se/en/eecs/utbildning/hedersk odex/inledning-1.17237



## Rules in Code of Honour

Rule 1: All members of a group are responsible for the group's work

Rule 2: In any assessment, every student shall honestly disclose any help received and sources used

Regulation 3: In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution

Rule 4: Do not copy from other people's solutions

Rule 5: Handle attendance lists correctly

Rule 6: Give help in the right way



## Grading



Grades A (excellent) – E (lowest passing grade)
Grade Fx means you can get to E by some extra task(s)
Goal oriented and absolute grading system at KTH (and not relative grades)

- All can fail, All can get an A

It is **not ECTS** but looks similar

Passing is often around 50% of the max score The full grading scale is used Failing an exam is not a total failure; re-exams are allowed



## Going abroad



If you go abroad you can swap courses at KTH for courses in the other university. This way you do not have to "lose time" toward the degree.

It is mandatory to talk to the director/coordinator **before** going abroad to work out a curriculum.

All courses in the curriculum can be exchanged for courses in other universities but the requirements for the match are higher for compulsory courses.



# Rules and values at KTH (my interpretation)

- Creativity and critical thinking a good quality
- Active participation instead of always silently listening
- Being able to work in groups
- Social skills and being able to present your ideas to others
- Show us what you have learned using your own words
- Process often more important than product
- Quality and not quantity
- Hard work itself is not a guarantee for a passing or getting a good grade



### **Teacher student relation**

- Ask for help if you need it.
- Teacher unlikely to see that you need help and will not want to intrude
- Can ask the teacher questions, he/she is not a untouchable semi-god
- Organize study groups etc on your own (no copying)
- A teacher is often very busy and the lecture, seminar, exercise, etc is the time to ask the questions. Otherwise make appointment
- A teacher is not your father or mother, mostly a "business" relation



## Why do they keep referring to me as an "undergraduate student"???

### At KTH

- Undergraduate = Bachelor + Master
- Graduate = PhD



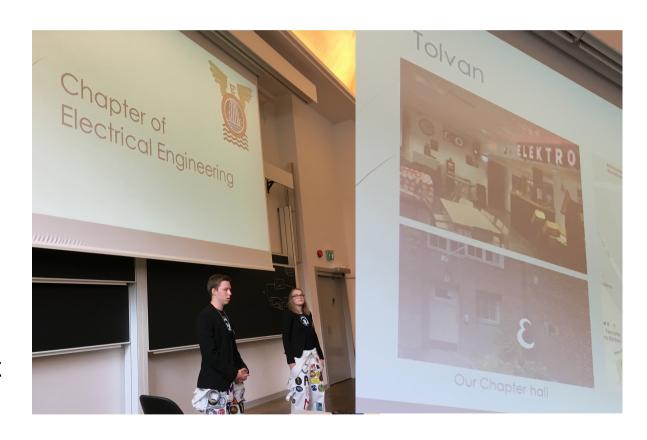
## Reading email

- People will expect you to read your email
  - Check your kth.se-address, or
  - Forward it



### **Electrical Engineering Student Chapter at KTH**

- Sports
- Boardgames
- Parties
- Facebook: EMiTGlobal
- axelol@kth.se
- Excellent opportunity to get into Swedish student life!





## Did I tell you all you need to know?

#### NO!

If you want good answers to your questions ask the right person

- Other students: How are things done in practice
  - Swedish students at SCR
  - EE Student Chapter
- Teachers: specifics about a course
- Cristina: Admin, course selection, etc
- Petter: Curriculum, program wide Q's
- Track responsibles: Track stuff
- ...
- (contract info on Program website)



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## **BSc Program Welcoming at KTH**













### **Questions?**

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YANG	SHAOHUI	HUMNE	ANKITA ARUN	QIAO	ZIHAN
ALLAN	MAURA	MOLINARI	MARCO	SARMIENTO GONZÁLEZ	LUIS ALEJANDRO
Lavebratt	Bill	BALARAM	SARADA	ELVARSDÓTTIR	HÓLMFRÍÐUR
Lin	Valentine	Modahl	Ylva	Hirsch	Daniel
Marstorp	Gustav	Nordén	Frans	Skoglund	Caroline
Ranjith	Adam	Persson	Frida	Larsson Forsberg	Albin
Team 2:		Team 6:		Team 10:	
CHITTEPU	YASWANTH	ZHANG	WANZHI	RUSTAMOV	JEYHUN
ZHANG	SHUBO	DE LIMA	OSCAR	JANSSON	MADELEINE
Gustavsson	Oscar	GUHA	ROUMEN	MARIOCORDIANO	FRANCESCO
Hemlin	Karl	Stadler	Karsten	Bonnevie	Rodrigue
Hestell	Filip	Steinholtz	Tim	Bui	Linda
Svensson	Olle	Svensson	Niclas	Corfitsen	Christian
Team 3:		Team 7:		Team 11:	
ALIYEV	TURAL	SAMPATH KUMAR	VARUN KUMAR	SHI	HAOXIANG
NGUYEN	DINH VINH THANH	MUHAMMAD ILYAS	MUHAMMAD ZAHID	MAHAJAN	AKANSHU
YING	ZAOSHI	Ahmadi	Seyedhesam	GHIGNONE	EDOARDO
Erlandsson	Oskar	Al-Janabi	Mustafa Ahmed Taha	Corneliussen	Ilian
Ghasemi	Hashem	Yap	Martti Lefika	Edlund	Joar
Greinsmark	Vidar	Vikgren	Mattias	Eriksson	Andreas
Team 4:		Team 8:		Team 12:	
KUMAR	MOHIT	VAZEERUDDIN	MOHAMMED ANAS	MAMBELLI	DAVIDE
COBLE	KYLE WILLIAM	SOUROULLA	TIMOTHEOS	SADASHIV	ARAVIND
DESHMUKH	SAVYARAJ RAVINDRA	VALLONE	ANDREA	SYAMIL	ABI RAHMAN
Melki	Jakob	Landin	Roman	Alkas Alias	Kildo
Miksits	Adam	Wilczek	Andrej Markus	Andersson	John
Mirzai	Badi	von Reis Marlevi	Filip	Bahmani	Mehrdad