

# IAF0320

# Computer Systems Engineering

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## LECTURE 1

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Department of Computer Engineering  
Tallinn University of Technology



## Agenda

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- Short course overview
  - Course aims
  - Course organization
- Systems Engineering

# What is Systems Engineering (SE)?

Systems Engineering (SE)

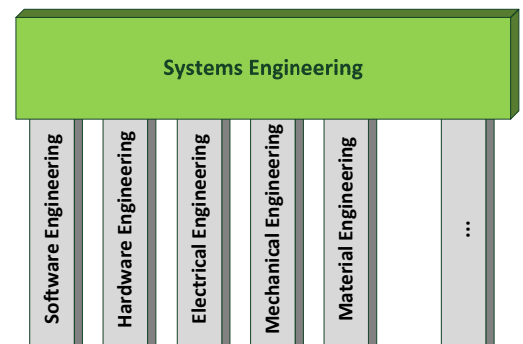
focuses on ensuring  
the pieces work together  
to achieve the  
objectives of the **whole**



## Systems Engineering

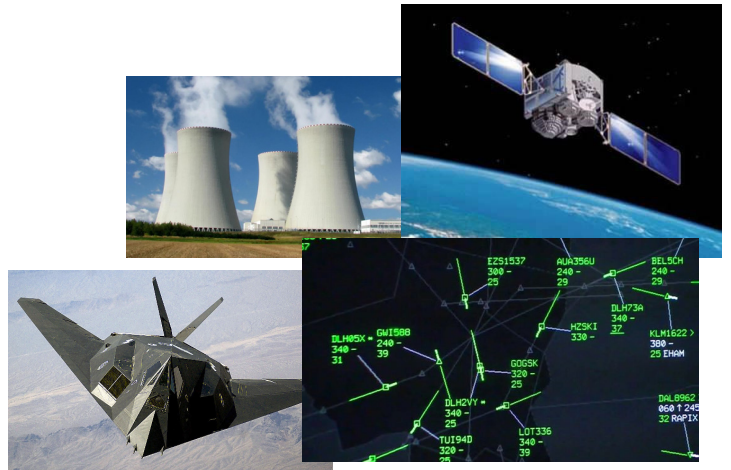
- SE is to guide the engineering of complex systems
- *Systems Engineering is an organised method for decomposing a large problem into a series of smaller, hierarchically arranged problems and the integration of the solutions to these smaller problems into a solution for the large problem*

[Grady, 1993]



# Examples of Systems Requiring SE

- Communication and weather satellites
- Air traffic control
- Airline navigation systems
- Truck location systems
- Clinical information systems
- Passenger aircraft
- Auto assembly plants
- Power plants
- ...



## Course targets ...

- Overview of the SE **discipline**, main **principles** and history
- Nature of **system life cycle**
- Role of **requirements** analysis in SE
- Types and importance of **specifications** and their applicability throughout the design process
- Architectural **design** and its implications
- Systems testing, maintenance and management
- Project management principles
- Development of complex hardware-software systems

# What will you learn?

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- SE principles and terminology
- Recognize the need for a disciplined approach in systems development
- Requirements analysis techniques and how to apply them to obtain requirements for a particular system
- Characteristics and creation of a high quality specification
- Selection and implementation of an appropriate approach to design a range of applications

# What will you learn?

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- Range of tests appropriate for each stage of the systems life cycle
- Nature of maintenance in computer systems engineering
- Addressing major problems of project management in computer engineering, including multidisciplinary issues
- Main design steps for designing complex computer-based systems

# Course plan

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- Instructor: Tarmo Robal (*PhD*), e-mail: [tarmo.robal@ttu.ee](mailto:tarmo.robal@ttu.ee)
- 16 meetings, a'4x45min (lecture + practice)
- Tuesdays 13:00-16:30
  - Lectures
  - Guest lectures
  - Practice
  - Teamwork

# Reading

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- No textbook
- Recommended reading:  
*Systems Engineering Principles and Practice, 2nd Edition. A. Kossiakoff, W. N. Sweet, S. Seymour, S. M. Biemer. April 2011*
- Materials provided throughout the course

# About Grading

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- You can get your exam grade based on your course performance
  - Based on:
    - Tests
    - Homework / Individual tasks
    - Team Project
    - Exercises as in-class practice
- ...or take a written exam in January
  - Prerequisites: Completed and passed individual assignments & homework tasks; completed and defended course teamwork project

# Course Content

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NEWS, MATERIALS, TASKS, RESULTS, ...

# Course materials

- All course materials available through e-EDU Course System at <https://edu.pld.ttu.ee/>
  - Course news
  - Tasks
  - Deadlines
  - Materials
  - Links
  - Instructors' contacts
- Access with **TUT Uni-ID**
  - <https://wiki.ttu.ee/it/en/doc/uni-id>



## e-EDU Course System



<https://edu.pld.ttu.ee>

- **TUT Uni-ID** necessary for login
  - Get: <http://pass.ttu.ee> or OIS <https://ois.ttu.ee>
  - More information about Uni-ID: <http://pass.ttu.ee>
  - Uni-ID problems: ICT-410 or phone 620 3333 or [helpdesk@ttu.ee](mailto:helpdesk@ttu.ee)
  - e-EDU problems: [edu@pld.ttu.ee](mailto:edu@pld.ttu.ee)

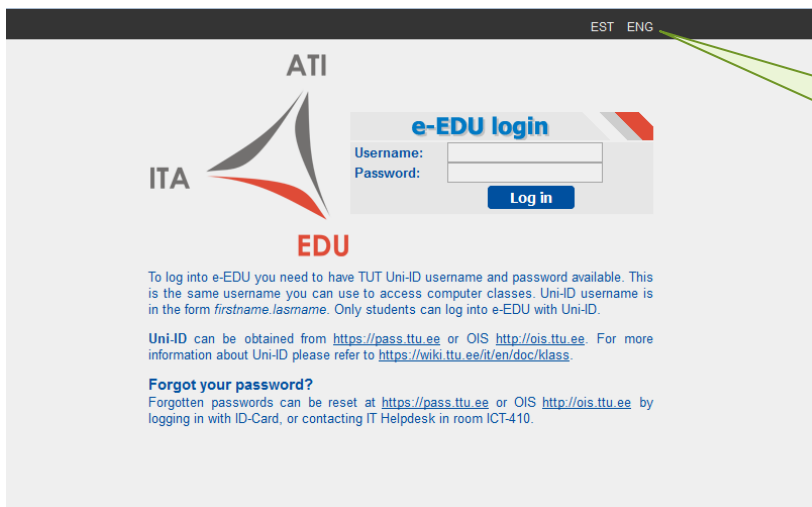
More information about IT resources for students: <https://wiki.ttu.ee/it/en/doc/klass>

# e-EDU – Course Signup

- Sign up to the course at first occasion with Uni-ID
- Latest by **September 05, 2016**
  - NB! This is **not** equal to declaring the subject in OIS!
- Go to <https://edu.pld.ttu.ee>
- Accept the certificate
  - Some browsers may give you a security warning, just ignore it
  - Log into the system with TUT Uni-ID

# e-EDU – Course Signup

Entry page <https://edu.pld.ttu.ee>



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EDU

**e-EDU login**

Username:

Password:

**Log in**

To log into e-EDU you need to have TUT Uni-ID username and password available. This is the same username you can use to access computer classes. Uni-ID username is in the form *firstname.lastname*. Only students can log into e-EDU with Uni-ID.

Uni-ID can be obtained from <https://pass.ttu.ee> or OIS <http://ois.ttu.ee>. For more information about Uni-ID please refer to <https://wiki.ttu.ee/it/en/doc/klask>.

**Forgot your password?**

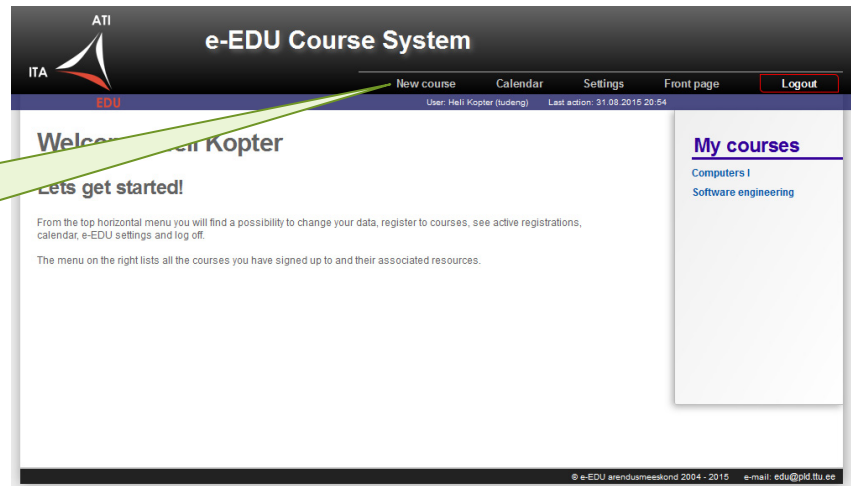
Forgotten passwords can be reset at <https://pass.ttu.ee> or OIS <http://ois.ttu.ee> by logging in with ID-Card, or contacting IT Helpdesk in room ICT-410.

Choose your preferred language here



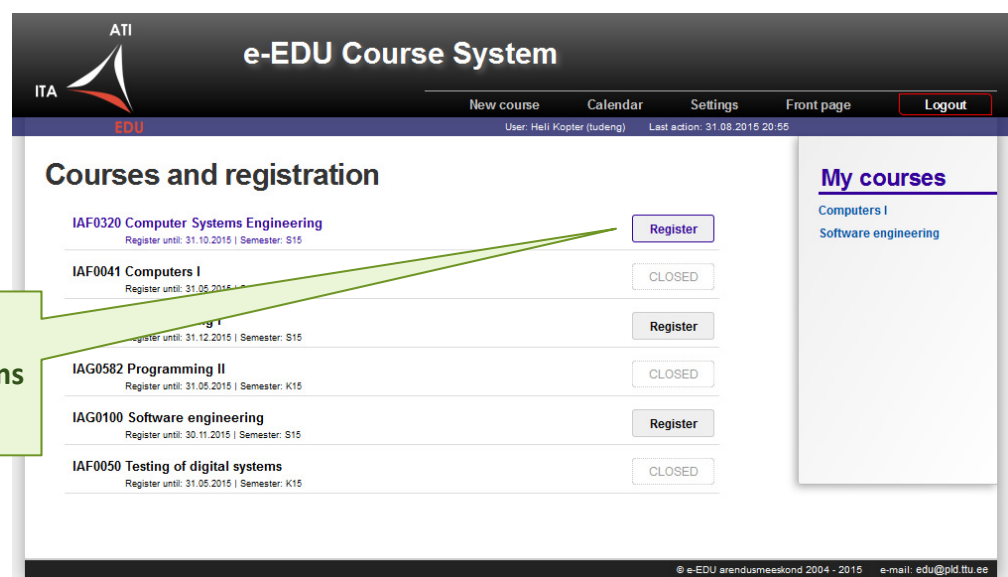
# e-EDU – Course Signup

Choose **New course** to begin  
signup



# e-EDU – Course Signup

Choose course  
**IAF0320 Computer Systems  
Engineering**



# e-EDU – Course Signup

The screenshot shows the 'e-EDU Course System' interface. The top navigation bar includes links for 'New course', 'Calendar', 'Settings', 'Front page', and a 'Logout' button. The user is identified as 'User: Heli Kopter (tudeng)' with a 'Last action: 31.08.2015 20:58'. The main heading is 'Course signup' with the sub-heading 'Step 1 - Registrant data'. A horizontal tab bar shows 'Registrant data' as the active tab, followed by 'Study form', 'Instructors', 'Classes', and 'Confirmation'. The form fields are as follows:

Firstname	Heli		
Lastname/Surname	Kopter		
Student code(s)	666665	Student code(s)	
e-mail	heli.kopter@tud.ttu.ee		
	Please add 1 contact e-mail address		
Study field	IASM	Study field designator, i.e., IASM	
Student group	11	Study group number, i.e., 11	

A green 'NEXT →' button is located at the bottom right of the form. On the right side of the page, there is a 'My courses' sidebar with links for 'Computers I' and 'Software engineering'. The footer contains the text '© e-EDU arendusmeeskond 2004 - 2015 e-mail: edu@pld.ttu.ee'.

Fill in your:

- email
- study field = IASM
- and group = 11

# e-EDU – Course Signup

The screenshot shows the 'e-EDU Course System' interface at 'Step 2 - Course study form selection'. The top navigation bar is identical to the previous slide. The user is 'User: Heli Kopter (tudeng)' with a 'Last action: 31.08.2015 20:57'. The main heading is 'Course signup' with the sub-heading 'Step 2 - Course study form selection'. A horizontal tab bar shows 'Registrant data', 'Study form' (active), 'Instructors', 'Classes', and 'Confirmation'. The form fields are:

Course	IAF0320 Computer Systems Engineering
Studies form	Full-time studies

A 'back' button is on the left, and a green 'NEXT →' button is on the right. The 'My courses' sidebar on the right remains the same. The footer text is '© e-EDU arendusmeeskond 2004 - 2015 e-mail: edu@pld.ttu.ee'.

At this step there are no options for this course

Click Next

# e-EDU – Course Signup

The screenshot shows the 'e-EDU Course System' interface. At the top, there is a navigation bar with links: 'New course', 'Calendar', 'Settings', 'Front page', and 'Logout'. Below this, a user status bar shows 'User: Heli Kopter (tudent)' and 'Last action: 31.08.2015 20:58'. The main heading is 'Course signup' followed by 'Step 3 - Registration instructor'. A progress bar indicates the current step: 'Registrant data', 'Study form', 'Instructors' (active), 'Classes', and 'Confirmation'. The 'Course' field is set to 'IAF0320 Computer Systems Engineering'. The 'Main instructor' field has a dropdown menu with the text '- please choose -'. There are 'back' and 'NEXT →' buttons. On the right, a sidebar titled 'My courses' lists 'Computers I' and 'Software engineering'. The footer contains copyright information: '© e-EDU arendusmeeskond 2004 - 2015' and 'e-mail: edu@pld.ttu.ee'.

Make your choice and click  
Next

# e-EDU – Course Signup

The screenshot shows the 'e-EDU Course System' interface at 'Step 4 - Signup for classes'. The navigation bar and user status bar are identical to the previous slide. The progress bar shows 'Registrant data', 'Study form', 'Instructors', 'Classes' (active), and 'Confirmation'. The 'Course' field remains 'IAF0320 Computer Systems Engineering'. A text prompt reads: 'From the choices given below please choose the study group in which you are planning to participate the classes'. There are two dropdown menus: 'Lectures' and 'Labs', both with the text '- please choose -'. 'back' and 'NEXT →' buttons are present. The 'My courses' sidebar is also visible. The footer is the same as the previous slide.

Make your choice and click  
Next

# e-EDU – Course Signup

The screenshot shows the 'e-EDU Course System' interface. The main content area displays 'Course signup' and 'Registration confirmation' with a green checkmark icon and the text: 'You have successfully signed up to the course. You can access course resources from the menu on the right.' A green callout box points to the 'My courses' sidebar menu, stating: 'After successful registration your courses menu is updated with **Computer Systems Engineering**'. The sidebar menu lists: 'Computer Systems Engineering', 'Computers I', and 'Software engineering'. The top navigation bar includes links for 'New course', 'Calendar', 'Settings', 'Front page', and 'Logout'. The footer shows the user 'Heli Kopter (tudeng)' and the last action '31.08.2015 20:59'.

# e-EDU – Course Setup

The screenshot shows the 'e-EDU Course System' interface for the 'Computer Systems Engineering' course. The main content area displays the course title and a list of links: 'Subject description card (OIS)', 'Course news', 'My materials', 'My tasks', 'Events', 'Deadline reminder', 'Links', and 'Teachers' contacts'. Below the links is a paragraph describing the course: 'Principles, history and terminology of systems engineering discipline, Life cycle and its role in systems engineering. Requirements analysis and different aspects of requirements. Specifications, use of specifications throughout the design process. Architectural design and its implications. Systems testing, maintenance and management. Project management principles, version management and quality assurance. Development steps of complex hardware-software systems.' The sidebar menu lists: 'Computer Systems Engineering', 'Computers I', and 'Software engineering'. The top navigation bar includes links for 'New course', 'Calendar', 'Settings', 'Front page', and 'Logout'. The footer shows the user 'Heli Kopter (tudeng)' and the last action '31.08.2015 21:21'.

# e-EDU – Course Menu Setup

## Course news

All the necessary information regarding course flow

## My materials

Course materials, slides, etc.

## My tasks

List of tasks and their results

## Events

Events that require pre-registration

## My deadlines

Overview of task and event deadlines

## Links

Additional materials/links to course-related resources

## Contacts

### My courses

#### Computer Systems Engineering

course news  
my materials  
my tasks  
events  
my deadlines  
links  
contacts

#### Computers I

Software engineering

# For the Next Time

## 1. Get TUT UNI-ID

Deadline: 12 SEP 2016

## 2. Register in e-EDU for course IAF0320 Computer Systems Engineering

## 3. Reading & Browsing tasks:

- READ: Chris Argyris, "*Teaching Smart People How to Learn*", Harvard Business Review (PDF: [http://pld.ttu.ee/IAF0320/chris\\_argyris\\_learning.pdf](http://pld.ttu.ee/IAF0320/chris_argyris_learning.pdf))
- BROWSE: "Guide to the Systems Engineering Body of Knowledge (SEBoK)"  
[http://sebokwiki.org/wiki/Guide\\_to\\_the\\_Systems\\_Engineering\\_Body\\_of\\_Knowledge\\_%28SEBoK%29](http://sebokwiki.org/wiki/Guide_to_the_Systems_Engineering_Body_of_Knowledge_%28SEBoK%29)

■ ...

# For the Next Time

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Deadline: 12 SEP 2016

4. Think of **4 systems** that you would love to develop during your career, or systems that would make our everyday lives easier, or systems you think the human kind is still missing. Mark down your ideas.
- A downloadable **Task Sheet** and e-EDU registration instructions in PDF are available for you for a limited time at <http://www.tud.ttu.ee/web/Tarmo.Robal/IAF0320/>
  - More stuff under course materials in e-EDU after registration

# Intro into SE

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# Videos in the Presentation

- **What is "Systems Engineering" ? | Elementary collection**  
(source: [https://www.youtube.com/watch?v=Eap9kmlz\\_6k](https://www.youtube.com/watch?v=Eap9kmlz_6k))
- **Engineering Your Future - Systems Engineer**  
(source: [https://www.youtube.com/watch?v=68gPf7g\\_670](https://www.youtube.com/watch?v=68gPf7g_670))
- **Systems Engineering**  
(source: <https://www.youtube.com/watch?v=m3L9bEAha1I>)
- **A Day in the Life - Systems Engineer; Texas Instruments**  
(source: <https://www.youtube.com/watch?v=f3lt13jWOGk>)
- **Systems Engineering: Thoughts from a leading analyst; IBM DevOps**  
(source: <https://www.youtube.com/watch?v=6XuQt7azohM>)

## References

A. Kossiakoff, W.N. Sweet, S. Seymour, S.M. Biemer, Systems Engineering Principles and Practice 2nd Edition. Wiley, 2011, 560p.

Systems Engineering Handbook. A guide for system life cycle processes and activities. INCOSE. 2011

What is "Systems Engineering" ? | Elementary collection (source: [https://www.youtube.com/watch?v=Eap9kmlz\\_6k](https://www.youtube.com/watch?v=Eap9kmlz_6k))

Engineering Your Future - Systems Engineer (source: [https://www.youtube.com/watch?v=68gPf7g\\_670](https://www.youtube.com/watch?v=68gPf7g_670))

Systems Engineering (source: <https://www.youtube.com/watch?v=m3L9bEAha1I>)

A Day in the Life - Systems Engineer; Texas Instruments (source: <https://www.youtube.com/watch?v=f3lt13jWOGk>)

Systems Engineering: Thoughts from a leading analyst; IBM DevOps (source: <https://www.youtube.com/watch?v=6XuQt7azohM>)

# Thank you!

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SEE YOU NEXT TIME!