Use and Production of Information and Knowledge in Technical University Education

The Moving Border of Tacit and Explicit Knowledge in e-Learning

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Teaching and Learning Development

Contents

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  - Background: the university, governmental policy
  - Questions
- Approaches to learning resources
- Research process
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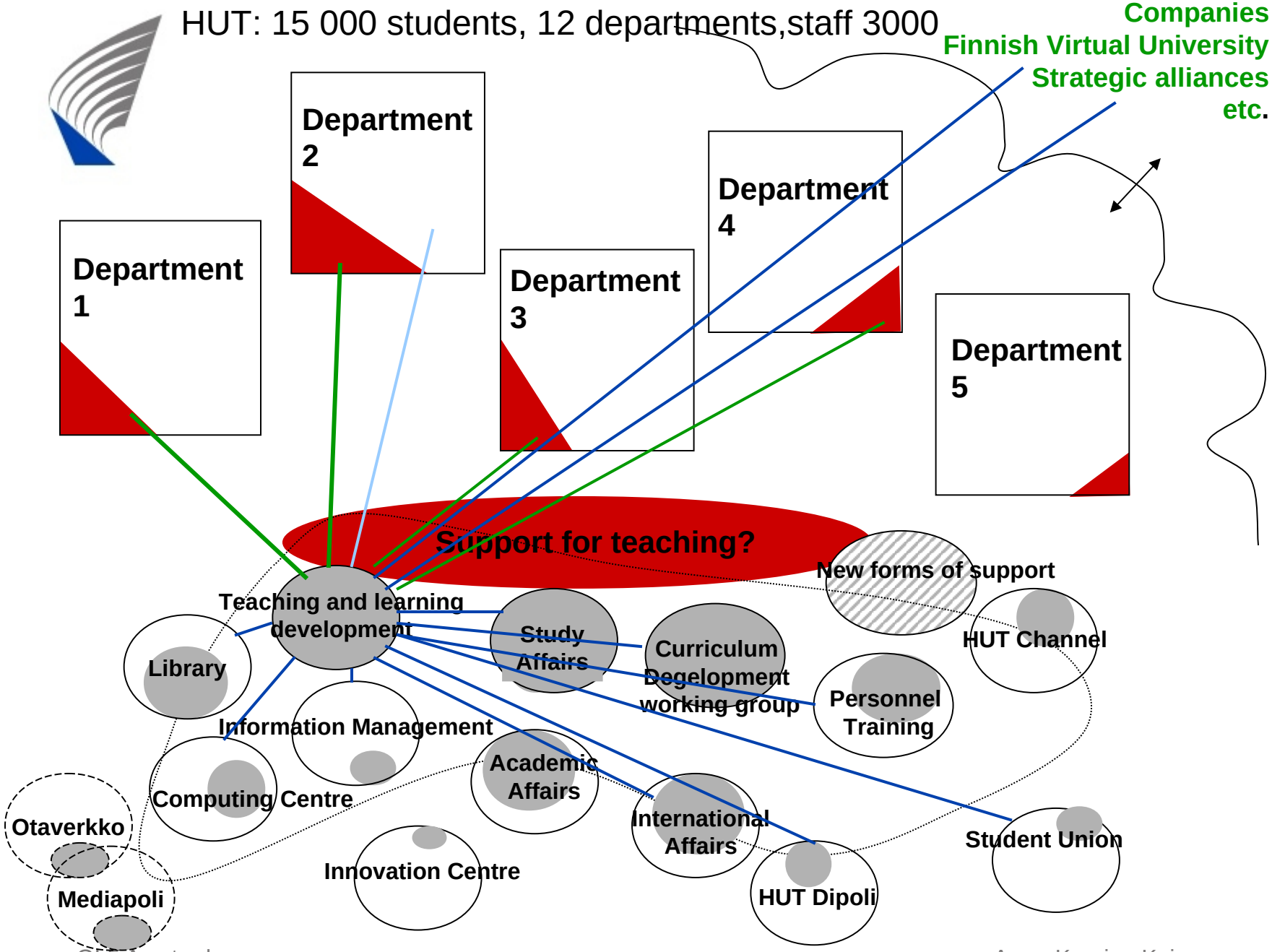
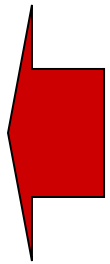
- Further research


HUT: 15 000 students, 12 departments,staff 3000
Companies
Finnish Virtual University
Strategic alliances
etc.
Department 1
Department 2
Department 3
Department 4
Department 5
Support for teaching?
Teaching and learning development
Library
Study Affairs
Curriculum Degelopment working group
New forms of support
HUT Channel
Personnel Training
Information Management
Computing Centre
Academic Affairs
International Affairs
Student Union
Otaverkko
Mediapoli
Innovation Centre
HUT Dipoli

Levels of educational and instructional development of HUT

- Restructuring the degree
  - new Bachelor-Masters structure 1.8.2005
- Curriculum development
  - essential part of degree development process
- Courses
  - teaching methods, implementation of ICT
- Counselling
  - skills, counselling system
- Study skills
  - courses for students



Teaching and learning development:

- Programmes of higher education pedagogy
- Programmes of ICT in education
- Tailor made courses, workshops
- Consultation for development projects
- Facilitation of processes
- Information and tools on www, publication
- Contributing as an expert

Information resources of teaching and learning ?

Governmental policy

- Pedagogical renewal towards student-centered teaching methods
- Promoting network-based and open and distance learning
- Set up Finnish virtual university

Finnish Virtual University

Suomen virtuaaliyliopisto - Finlands virtuella universitet

- Project organisation for promoting and developing networking in universities
  - develops procedures and co-operative networks in virtual education, aim to make them a natural element in the Finnish higher education system
  - promote the educational use of ICT and electronic access to services
  - supports the development of competence and quality in multiform and online education in Finnish universities
  - promotes the co-operative production of courses by academic subject networks

The research university culture

- Loose coalition of autonomous actors
- Research: traditions of collective discussion and critics, cumulative knowledge
- Teaching:
  still tradition of the classic university existing:
  teaching is the individual activity of the teacher, the master
- Production of learning resources fragmented
- No cumulation of instructional knowledge, yet

➡ Simulation of the systems of research?

HUT profile in change process

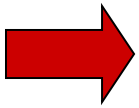
Fisser 2001

	Uncertain context	Interconnected context
Social cause	**Profile 1: Supporting learners in a changing world Helsinki University of Tech.**	**Profile 2: Developing expertise in the institution**
Economic cause	**Profile 3: Surviving in a competitive world**	**Profile 4: Evolving to a cost-effective approach in education**

- The primary motive to use ICT in education was social
- The new forms of ICT have not brought a major change in the way education is offered and supported.
- ICT has been implemented in education on a voluntary basis.

- We have created excellent systems for strategy work and processes,but,
  - How strategies area realised in individuals' every day work?
  - How individuals adopt strategies?

Saku Mantere:
Champion, citizen, cynic?
Social positions in the strategy process 2003



Do we really know what is happening in grassroots level of ICT enhanced university education in an non-centrally directed organisation?

Background

- One of the benefits of e-Learning often mentioned: reusability of material across the courses.
- Most course management systems do not yet support knowledge transfer. Information is still blocked to one course.
- Possibilities of the electronic materials offered by libraries, information services and commercial organisations are not widely used for undergraduate education.
- Different structures and content types emerge. BUT, there is also room for innovative solutions.
- If in current circumstances the teachers do not push (material) for reuse, may be we should pull?

Questions

- What kind of information and knowledge is available for the whole community of a course?
- What kind of information and knowledge is produced by the instructors and is there any knowledge used as a resource, created by the student?
- What kind of external resources are used?
- What is the potential reusability of the information and knowledge produced for the course?

Learning object

- Entity that can be used or referenced during technology supported learning (Koper 2001)
- Learning object includes content and/or method type of information.
- Unresolved issues:
  - Degree of granularity
  - Smaller the unit, greater the possibility that it will be reused
  - Larger object might include activities: may save teacher's time, but might not fit into the context

the analysis

Adapted from Collis-Moonen 2001

- Course organisation
  - course information
  - adminstration: record keeping, student marks
  - general planning for the course
- *Lectures and other forms of instructor-led sessions*
  - lecture material, highlights etc.
- *Self study, assignments*
  - readings
  - activities and assignments
  - practical excercises
- *Major assignment (project work, essay, product, case study etc.)*
- Testing and examination
- Guidance, mentoring
  - guides, tips, etc.
  - communication

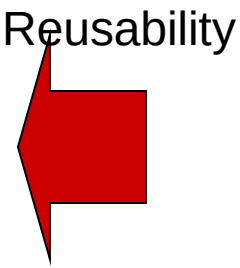
Digital learning material

Open literature

- Peer review
- Editorial review

Grey literature

- No peer review
- Personal review



- Digital learning material peer reviewed by colleagues ?
- One reason for thresholds to be higher?

- Teaching (material) as a private activity

Elements of a network based course

- IEEE LOM Educational category describes the key educational or pedagogic characteristics of this learning object.

- Document types (IEEE LOM) defined by means of interactivity types
  - expositive: for reading, watching, listening
  - active: forms, tests, games, simulations, animations, etc.
- IEEE LOM define also some other features: structure, aggregation level

- Made for a specific context (course?)
- External resources used

Steps

Building theory

Preliminary understanding of the phenomenon

Definition of research questions

Selection of initial research constructs

Literature review

Sharpening the research set-up
Specifying research question

Final literature review

Interpretation of results

Conclusions

Hypothetical model

Theoretical contribution

Practical utility

Recommendations

Analysing data

1st round of analysis of the two cases
2nd round of analysis
And cross-case analysis
Presentation of the results and discussion of the cross-case findings

Within case analysis
Cross-case analysis
Presentation and discussion of the findings

Collecting data

Selection of the first two cases
Qualitative data collection: interviews and simulation sessions

Selection of the 10 other case studies

Data collection and unstructured interviews

Original idea from Heikkilä 2003

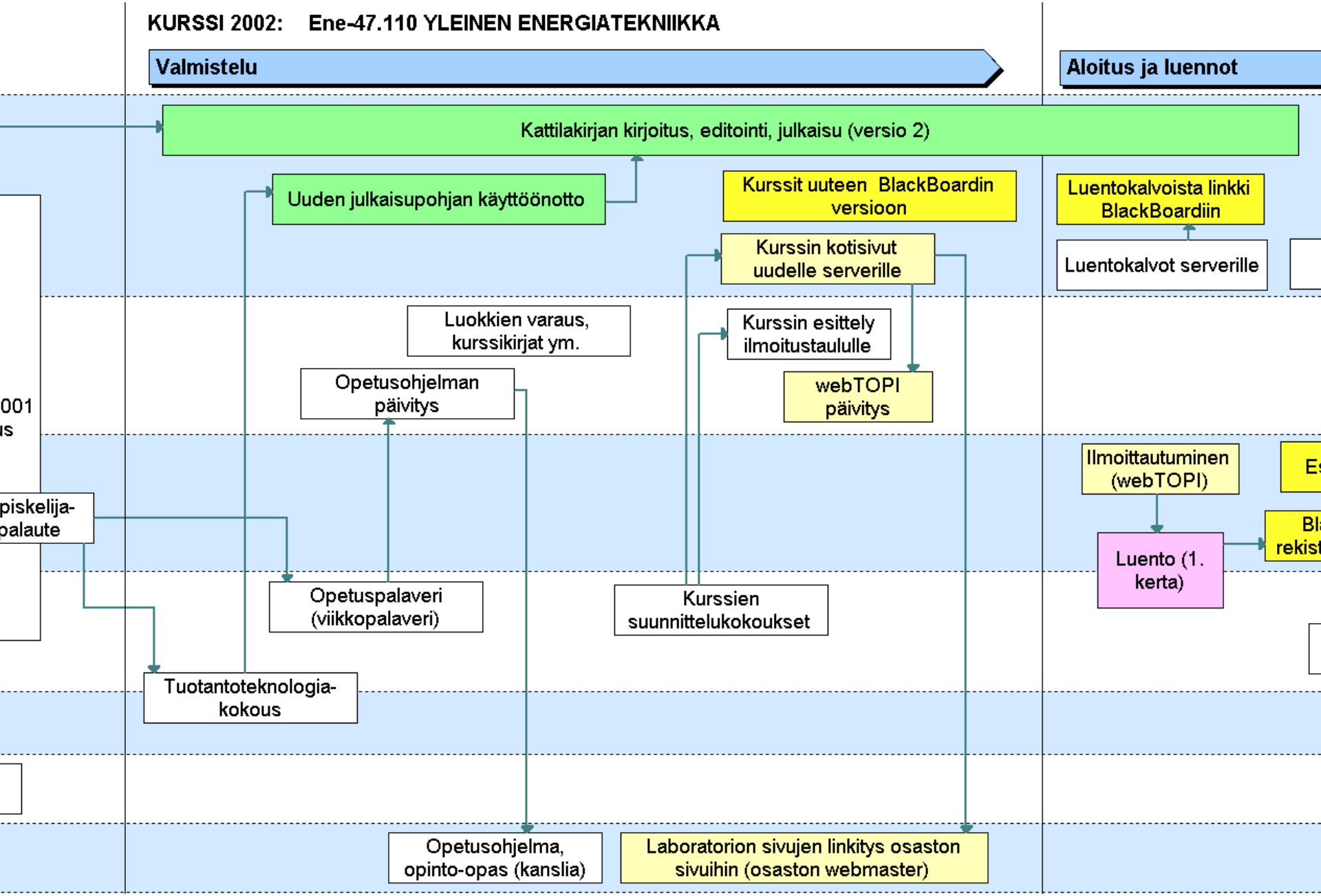
Helmi: Holistic development of e-Learning and business models

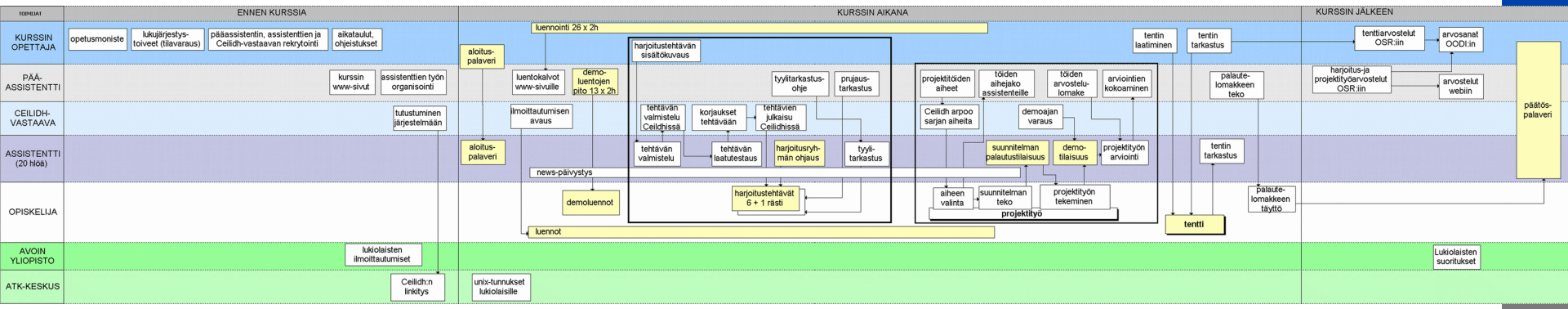
- Research and develop innovations in processes and business models of Finnish networks of e-Learning
  - Practical objective: develop good practices and ideas for innovations for customer-driven e-Learning processes and business models
  - Scientific objective: develop and accumulate new scientific knowledge about collaborative innovation and learning in the emerging e-Learning business network
- Constructive research approach
  - Action research in the case projects
  - Comparative case research
  - Longitudinal follow-up studies
  - Multidisciplinary research

SimLab™

The SimLab™ Business Process Simulation

- Analysis and mapping of the process
- Structured and directed process discussion with case project examples
- Visualization
- Participation: whole personnel involved
- From tacit to explicit knowledge
- Knowledge sharing and creation


KURSSI 2002: Ene-47.110 YLEINEN ENERGIATEKNIIKKA
Valmistelu
Aloitus ja luennot
Kattilakirjan kirjoitus, editointi, julkaisu (versio 2)
Uuden julkaisupohjan käyttöönotto
Kurssit uuteen BlackBoardin versioon
Luentokalvoista linkki BlackBoardiin
Kurssin kotisivut uudelle serverille
Luentokalvot serverille
Luokkien varaus, kurssikirjat ym.
Kurssin esittely ilmoitustaululle
Opetusohjelman päivitys
webTOPI päivitys
001
us
Ilmoittautuminen (webTOPI)
piskelija-palaute
Luento (1. kerta)
Opetuspalaveri (viikkopalaveri)
Kurssien suunnittelukokoukset
Tuotantoteknologia-kokous
Opetusohjelma, opinto-opas (kanslia)
Laboratorion sivujen linkitys osaston sivuihin (osaston webmaster)


TOIMIJAT
ENNEN KURSSIA
KURSSIN AIKANA
KURSSIN JÄLKEEN
KURSSIN OPETTAJA
PÄÄ-ASSISTENTTI
CEILIDH-VASTAAVA
ASSISTENTTI (20 hlöä)
OPISKELIJA
AVOIN YLIOPISTO
ATK-KESKUS
opetusmoniste
lukujärjestys-toiveet (tilavaraus)
pääassistentin, assistenttien ja Ceilidh-vastaavan rekrytointi
aikataulut, ohjeistukset
kurssin www-sivut
assistenttien työn organisointi
tutustuminen järjestelmään
lukiolaisten ilmoittautumiset
Ceilidh:n linkitys
luennointi 26 x 2h
aloitus-palaveri
luentokalvot www-sivuille
demo-luentojen pito 13 x 2h
ilmoittautumisen avaus
aloitus-palaveri
news-päivystys
demoluennot
luennot
unix-tunnukset lukiolaisille
harjoitustehtävän sisältökuvaus
tyylitarkastus-ohje
prujaus-tarkastus
tehtävän valmistelu Ceilidhissä
korjaukset tehtävään
tehtävien julkaisu Ceilidhissä
tehtävän valmistelu
tehtävän laatutestaus
harjoitusryh-män ohjaus
tyyli-tarkastus
harjoitustehtävät 6 + 1 rästi
projektitöiden aiheet
töiden aihejako assistenteille
töiden arvostelu-lomake
arviointien kokoaminen
Ceilidh arpoo sarjan aiheita
demoajan varaus
suunnitelman palautustilaisuus
demo-tilaisuus
projektityön arviointi
aiheen valinta
suunnitelman teko
projektityön tekeminen
projektityö
tentin laatiminen
tentin tarkastus
tentti
palaute-lomakkeen teko
tentin tarkastus
palaute-lomakkeen täyttö
tenttiarvostelut OSR:iin
arvosanat OODI:in
harjoitus-ja projektityöarvostelut OSR:iin
arvostelut webiin
Lukiolaisten suoritukset
päätös-palaveri

HUT cases

- Energy engineering and environmental protection courses
  - Students from 12 to 20
  - Awarded learning material
  - New pedagogical ideas
  - CMS for course management
- Introductory computer programming course
  - 300 complete the course
  - Virtual instructor team
  - Web pages including everything required for students and the instructor team

Ene-47.110 Yleinen energiatekniikka (2 ov)

Kurssimateriaali - Course material

Extra course material for excersices and extra lecture material

- Lecture by Tuula savola on the 30th of September: U.S. DOE's Vision 21 Research Program. Lecture slides(English) and Summary of project(Finnish)
- Lecture by Antti Komulainen on the 23rd of September: Process simulation and Prosim. Lecture slides(English)
- Boiler Calculations (see T-Q, T-s, p-h and h-s-diagrams), chapter form e-book "Steam Boiler Technology" by Sebastian Teir (requires a username and a password sent to students by e-mail)

6.11.2003 Ene-47.110 Exersice results (Complete)

Exercise solutions (only in Finnish, sorry)

1. Exercise: Problem 1 & Problem 2

2. Exercise: Problem 1

3. Exercise: Problem 1 & Problem 2

4. Exercise: Problem 1 & Problem 2

2.10.2003 4. Exercise (DL 8.10): Problem 1 & Problem 2 (Assignment in Finnish and English)

23.9.2003 3. Exercise (DL 1.10): Problem 1 & Problem 2 (Assignment in Finnish and English)

16.9.2003 2. Exercise (DL 24.9): Problem 1 (Assignment in Finnish and English)

9.9.2003 1. Exercise (DL 19.9): Problem 1 & Problem 2 (Assignment in Finnish)

+ animations
simulations password secured

T-106.216 Basic Course in Programming Y1 - Course Brochure

Synopsis:

The course is one of the introductory computer programming courses provided by the Laboratory of Information Processing Science. It is meant for students **not** from the following HUT departments: Automation and Systems Technology (AS), Engineering Physics (TF) and Information Technology.

Goals:

The course initiates the student into the central concepts and methods of computer programming, using the Java programming language. The whole of Java will not be covered by this first course; the emphasis will be on using the basic tools of the language. After passing the course, the students should be able to autonomously expand their knowledge of the available Java tool libraries.

Study Credits:

5. The course is demanding and the timetable very tight; students should be prepared for this.

Preliminary Requirements:

No preliminary knowledge on computer programming is required. Students must know the basics of computer usage (text processing, e-mail, WWW, 'news groups') in order to be able to work on this course. The course T-106.003 Computer As A Tool gives sufficient information on these subjects.

To access the Ceilidh software that is used on the course, students must have a user ID in the HUT Computing Center UNIX system.

Registering:

Registration for the course starts on January 15th at 16:00, and ends on January 31st at 12:00. Registering is done with Ceilidh-system.**WWWTopi cannot be used for signing up.**

Registering for specific exercise groups is not necessary, all groups are free for everyone. Students must register for examinations in advance with the WWWTopi system. The registration for an exam will be closed one **week** before the actual exam date.

Course Book:

The following books are recommended for this course:

- Lewis, Loftus: Java Software Solutions: Foundations of Program Design, Addison-Wesley. (The more recent editions cover newer versions of Java, but an older edition should be sufficient for this course as well.)
- Kölling, Barnes: Objects first with JAVA - a practical introduction using BLUEJ, Prentice Hall.Introduction to Java programming using BLUEJ, which is available free from the net and is supplied on cover CD with the book.

Course Structure:

Unit Contents

The exercises will be published here as soon as they are ready. The model solutions to each unit will be published soon after the unit is closed

Unit 1

min. 0 points. -- max. 30 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	Model solution

Unit 2

min. 40 points. -- max. 80 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	Model solution
Exercise 4	Model solution
Exercise 5	Model solution
Exercise 6	Model solution

Unit 3

min. 40 points. -- max. 80 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	Model solution
Exercise 4	Model solution
Exercise 5	Model solution
Exercise 6	Model solution

Unit 4

min. 40 points. -- max. 80 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	B Model solution
Exercise 4	Model solution
Exercise 5	Model solution
Exercise 6	Model solution

Unit 5

min. 40 points. -- max. 80 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	Model solution
Exercise 4	Model solution
Exercise 5	Model solution

Unit 6

min. 0 points. -- max. 140 points. -- closed

Exercise 1	Model solution
Exercise 2	Model solution
Exercise 3	Model solution
Exercise 4	Model solution
Exercise 5	Model solution

Style Checking assignment

Case 1

- The key enablers of the development process
  - The previous experiences of the instructors on implementing ICT in training
  - High technical skills of the key person of the project
  - A positive and encouraging culture for testing new ideas was also critical success factor.
  - The active partnership with a foreign university within the field of education encouraged staff's endeavours.
- The key obstacle
  - The strict rules of the IT centre of the university.
- The results
  - Materials produced for reuse of other courses
  - External resources: links and single objects inside the material
  - The structures of published information based mainly on the ideas of the laboratory
  - The production system is vulnerable.

Case 2

- ICT in education is not a tool, it is part of culture.
- The course is a very well organised and documented with all possible help for the student in written form on web.
- The course process resembles ‘lubricated’ machine, where the role of each actor is well-defined and strictly rule-governed: the responsible teacher, the assistants and the students.
- The structure of electronic information has developed in an evolutionary process.
  - Resources produced to support this course, reuse on the next course
  - Potentially reusable resources related to course organisation and guidance
  - External resources used web resources and guides and tips ofr programming

Further examination

- To what extent do the instructors search for possible external resources and why do they include or leave out materials in their course?
- How are the already produced resources of the courses reused in other contexts?
- How do the granularity and independence of the information object or dependence on the production context enable or restrict reusability?
- What are the criteria of the instructors for quality of information?
- To what extent is electronic scientific information used in courses and how?

Thank you!

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