

# **Architecture & Design of Embedded Real-Time Systems (TI-AREM)**

## **Course Introduction**

# Presentation of Teacher

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## Experiences:

Worked with SW development since 1978,

Worked with SW methods since 1985 (e.g. SPU, SA/SD-RT, OMT, OOA/OOD with UML)

Teached: C++ since 1991, OO analysis and design methods since 1993, Use Cases since 1996, Design Patterns since 1997 and UML based OO courses since 1997.

Project leader for COT research project (1997-2000): OO and Embedded Systems – case 2. ([www.cit.dk/COT](http://www.cit.dk/COT))

Technical Manager for the EU e-stocking project (2012-2015)

Started at IHA in 2001: Development of Tech IT master degree study, Group leader for the Embedded Systems Group.

# Presentation & Expectations

## Presentation round:

- Your background (study etc.)
- Your experiences:
  - OO/UML, C++ and design patterns:

**What are your expectations  
for this course?**

**Please fill in the following Google form:**

<http://goo.gl/forms/JpjiUuvoHd>

# AREM Learning Goals

## Learning outcomes and competences:

The participants must at the end of the course be able to:

- ***Design and construct*** an architecture for an embedded real-time system
- ***Validate*** a given architecture according to fulfilling the requirements
- ***Explain*** methods for scheduling and analysis of embedded real-time Systems
- ***Describe and document*** architecture and design of an embedded real-time system using UML
- ***Compare and reflect*** upon state-of-the-art research in software architecture

# AREM Focus Areas

- **Main focus:**
  - Architecture and design of embedded real-time systems using object-oriented technology
  - Architecture and design patterns in practice
- **Minor focus:**
  - Product documentation
  - Implementation and test

# AREM: Course Form

- Interaction between:
  - Lectures with presentation of theory
  - Exercises in minor groups
  - Student Article Presentations (SAP)
- Curriculum:
  - *"Real-Time Design Patterns"*, Bruce Powel Douglass (BPD),
  - Research articles and course notes
- Evaluation & examination:
  - Two mandatory hand-ins
  - Individual assessment based on an oral examination

# AREM Course Structure

**Tuesday:**

L1: 12.15-13.00

Theory Track L1

L2: 13.15-14.00

Theory Track L2

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**Friday:**

L3: 8.15-9.00

Theory Track L3

SAP: 9.15-10.00

Student Article Presentation  
and discussion track (SAP)

EXE:10.15.-12.00

**Assigned to Exercises,  
Self-study and preparation Track**

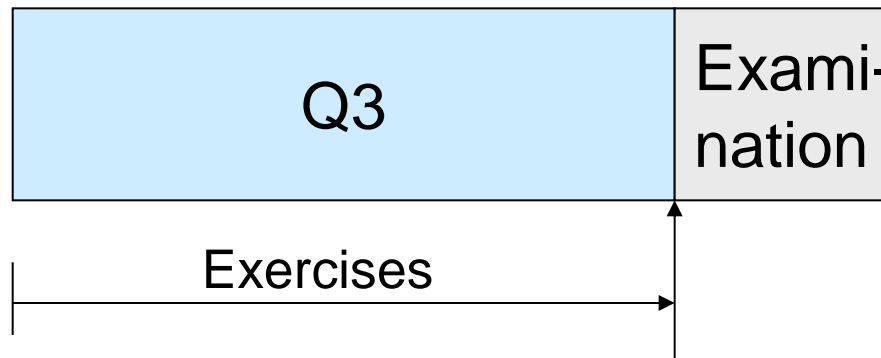
# Student Article Presentation (SAP) Track

- Preparation of slide presentation in study group
- Each study group must present one article during the course
- Each study group is opponent for one other group during the course
- 30 min: group presentation of research article
- 15 min: discussion slot with opponents asking questions



# AREM Course Schedule

**7 scheduled weeks of theory and exercises  
with two mandatory hand-in's**



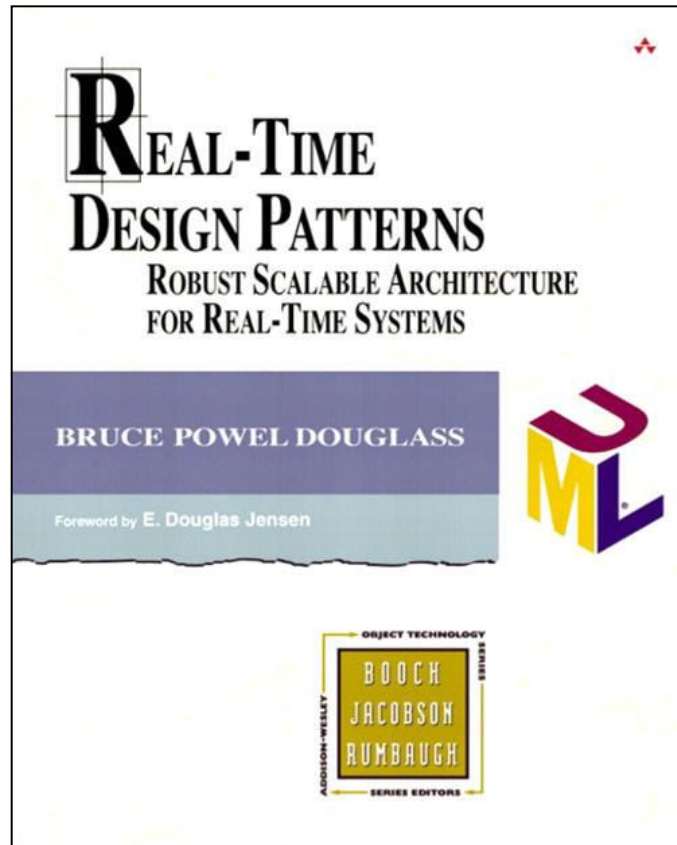
**The series of exercises builds upon the previous exercise.**

# Course info on Blackboard

- AU has decided that all course info from start of 2015 should be available on AU's new course management system: Blackboard.
- TIARDI has an overall short course schedule and a week plan for each of the 7 weeks.

# Course Materials

## Real-Time course book



Supplemented by  
selected reserach  
articles and notes  
- See course info on  
Blackboard

Addison Wesley, 2003, 500 pages,  
**ISBN: 0-201-69956-7**

# Constraints for exercises

- Implementation technologies and tools:
  - Case Tool: Rhapsody 8.x or equivalent
  - Implementation language C++
  - PC with Windows or Ubuntu Linux (via VMWare)

# Relationship with other Courses

