



DIT390, Concurrent Programming, 7.5 ECTS Credits

Basic Level

1. Establishment

The Faculty Board at the IT-university established the course plan at 2006-11-17. This course plan is effective from autumn 2007.

Educational area: Technology/Sciences

2. Location

The course is a part of the Computer Science Bachelor's programme and an elective course at Göteborg University.

3. Knowledge Requirements

The requirement for the course is to have successfully completed the first year of the Computer Science Bachelor's education or equivalent.

4. Learning Outcomes

Concurrent programming plays a vital role in systems where many events appear to occur simultaneously. This course aims to provide an introduction to the problems common to concurrent systems such as operating systems, distributed systems and real-time systems.

After the course, you should be able to apply practical knowledge of the programming constructs and techniques offered by modern concurrent programming languages. This includes the ability to identify synchronization problems, design and argue for the correctness, clarity, and efficiency of solutions, as well as implement such solutions in expressive programming languages.

You should be able to demonstrate the critical knowledge of:

- shared-memory and message-passing models,
- problems that arise in concurrent systems (such as shared update, dining philosophers, producer-consumer, resource allocation, time-outs), and
- common patterns for solving them (such as locks, client-server, pipelines, replicated workers, barrier synchronization, passing the baton, alarms)

5. Content

General concepts: parallelism, interference, synchronization, critical regions, mutual exclusion, deadlock, fairness, livelock. Synchronization using shared variables; busy waiting. Semaphores. Synchronous message passing: extended rendezvous. Monitors. Asynchronous coordination; Linda, Erlang.

6. Literature

See separate literature list.

7. Examination

The course is examined by means of workshops (pass only), exercises (pass only), and projects (grading). Some of these parts are carried out individually, some in groups of varying sizes.

8. Marks

The course is graded with the following marks: Fail, Pass, Pass with Distinction. The course can also, at the students' request, be marked according to ECTS standards.

9. Evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire can be used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

10. Other

The course is held in English.