

IA158 Real Time Systems

Exam manual

This manual specifies knowledge demanded at the IA158 exam. Please, keep in mind that the knowledge described below is *mandatory even for the E grade*. Missing a single part automatically means F. You may repeat the exam as many times as you wish (at the official exam dates), only the best grade goes into the information system.

- Slides 42 - 59: You need to know all definitions, formally, using the mathematical notation if present.

In particular, you need to be able to specify all components of the abstract real-time system's model, the notion of a schedule, etc.

- Slides 60 - 76. Everything in great detail.

In particular, you need to be able to provide all mathematical details as well as understanding of all theorems and proofs (including the content presented only on the greenboard).

- Slides 77 - 87. You have to know all definitions (especially the slide 80). You do not have to memorize the 4-tuple notation.

Note that you have to know the difference between clock-driven and priority-driven scheduling, offline vs online, etc.

- Slides 88 - 98. You have to know all definitions here.

In particular, you have to understand the basic algorithms, the definition of (maximum) schedulable utilization, etc.

- Slides 99 - 109 except the slides 105 - 107.

In particular, you have to completely understand the main Theorem 13 and the proof up to and including the simplified 2. \rightarrow 3. You may of course have a look at the complete version, we may discuss it at the exam as an advanced material (for the A grade).

- Slides 111 - 120. You have to know and understand all theorems and all proofs in detail.

Note that you may skip slides 121 - 125 if you wish.

- Slides 126 - 133. You have to know and understand everything in detail.

In particular, the critical instants, the time-demand analysis algorithm (note that the formula for $w_i(t)$ is *not* a complete algorithm), etc.

- Slides 134 - 153 except 149 - 151. You have to know everything in detail.

In particular, all the servers (polling, deferrable, very simple sporadic), the time demand analysis for the deferrable server including the critical instant and the algorithm itself, etc.

- Slides 156 - 167. Everything in detail except the proof of Thm 24 (slide 161).
- Slides 168 - 198 except (possibly) the slide 190. You have to know and understand everything in detail.

In particular, all the issues with resources (unbounded priority inversion, deadlock, timing anomalies), all three algorithms and their blocking times.

- Slides 204 - 229. Everything here except that you do not have to memorize the examples at the slides 213 and 215 (you may of course be asked to provide your own examples illustrating simpler phenomena).

In particular, the scheduling taxonomy, the fundamental limit, the Dhall's effect, etc.

- Slides 230 - 247. You have to know everything here, it is quite simple compared with the rest.
- The rest of the slides (from 248 on): You do not have to memorize all details but you should know how jobs/tasks are typically implemented using threads.