This course teaches how to be an intelligent user of sophisticated runtime environments. The programs we design are built to operate in the context of a software environment. Understanding the interaction between programs and their software environment (runtime environment) is the main topic of this course. The questions addressed during the course are:

- What are runtime environments (RTE)?
- Examples: Unix OS, Java Virtual Machine, etc.
- What are the functionalities and the structure of RTEs?
- What are the possibilities and the limitations for the users of RTE as programmers?
- How do we choose the right tools when designing programs for a given RTE? The lecture material includes:
  - Concurrency in multithread/multiprocess environment: how to exploit concurrency in your programs.
  - Memory management as viewed from programming languages (stack model, heap, pointers, copying).
  - Object Oriented Design - principles and essential tools (Modern RTEs provide an OO interface - learn what it means).
  - C++ Programming (Many RTEs only provide a C or C++ interface - learn to use it).
  - Interprocess communication using network protocols over sockets.
  - Data storage - files, databases (SQL), object serialization. The approach is top-down -- we start by introducing high-level abstractions for each of the topics (in general using Java), and then proceed to a more detailed view of the topic (in general using C++, Unix system calls, and Scripts). The focus is always on "how to use the RTE resources" and not on "how is the functionality implemented in the RTE" (which is the focus of the OS course). The practical sessions complete the lectures by presenting practical and technical details of the material and background on using program development tools (Makefile, Maven, JUnit, debuggers).

*The course includes a lot of practical work in the form of 3-4 full-scale programming assignments.*

**arse סיווג : 202-1-1031 (202-1-1031) (2021)**

** coursework :**

- עבורה - 30%
- מבולט - 70%

**דרישת הציון :**

- נמר מבר נבחר - 56
- נמר מבר נבחר (морכבים נבחרים + עבורה besteht) - 56
- נמר מבר נכות (Morcets מברות) - 56