Datacenters are the backbone of our modern digital universe. Their significance is only growing as demands for access to online services and the Cloud are surging and as service and Cloud providers advance their offerings in terms of quantity, quality, and maturity. This research-oriented course will cover a range of important datacenter design issues by heavily relying on the study of both seminal and recent research papers related to datacenter technologies. Topics of focus include key system components (processors, memory, networks), new specialized components appearing in response to technological advancements and workload demands, datacenter management policies (resource management and load balancing), as well as new datacenter trends and challenges, such as serverless and microsecond-scale computing.