

Resources

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Reference Materials

- 6.191 (6.004) Setup and Git Basics
 - [Setup and Git Basics](#)
- Bash and Git
 - [Bash and Git tutorial](#)
- Minispec
 - Minispec tutorials
 - Combinational logic [\[interactive\]](#) [\[pdf\]](#) [\[pdf, executed\]](#)
 - Sequential logic [\[interactive\]](#) [\[pdf\]](#) [\[pdf, executed\]](#)
 - These tutorials provide a first introduction to Minispec. They are interactive Jupyter notebooks, but we also provide PDF printouts for offline use.
 - [Minispec reference](#)
 - This is the primary reference for the Minispec language, covering its syntax and semantics in full. It is more more detailed than the Minispec tutorials, and is useful mainly to answer particular questions on syntax and to learn the language in depth.
 - [6.004 JupyterHub](#)
 - JupyterHub server used for Minispec tutorials and to learn the language. (Please do not use this for labs, use Athena instead.)
 - Minispec syntax setup [\[vim\]](#) [\[emacs\]](#) [\[nano\]](#) [\[pygments\]](#)
 - To set up other editors, since Minispec's syntax is a subset of Bluespec's, you can use any available syntax files for Bluespec and configure your editor to treat Minispec files (ending in `.ms`) as Bluespec files. Bluespec syntax files: [\[Atom\]](#) [\[VSCode\]](#) [\[Sublime Text\]](#)
- RISC-V
 - [6.191 \(6.004\) ISA Reference Tables](#)
 - Reference for the subset of RISC-V covered in 6.191 (Includes references for assembly programming as well)
- [Student's 6.004 notes from FA20](#)

Reading Materials

- [Digital Design: A Systems Approach](#), William J. Dally and R. Curtis Harting, Cambridge University Press, 1st ed., 2012.
- [Computer Organization and Design: The Hardware Software Interface, RISC-V Edition](#), David A. Patterson and John L. Hennessy, Morgan Kaufmann, 1st ed., 2017.
- [Computation Structures Online Materials](#) *Note: These materials correspond to the old version of 6.004, and parts of it are out of date.*

	Digital Design: A Systems Approach	Computer Organization and Design, RISC-V Edition	Computation Structures Online Materials
L01 The digital abstraction	Chapter 1, 1.1, 1.2 (pages 3-8)		Notes 5.1-5.8
L02 Boolean algebra	Chapter 3, 3.1-3.5		Notes 7.1-7.7 (skip 7.7.1)
L03 Combinational logic 1	Chapter 8, 8.1-8.7		Minispec combinational tutorial
L04 Combinational logic 2	Chapter 12, 12.1		Minispec combinational tutorial , Notes 12.2
L05 CMOS	Chapter 4; Chapter 5, 5.1-5.3		Notes 6.1-6.4
L06 Sequential logic 1	Chapter 14, 14.1-14.3; Chapter 15, 15.1-15.3		Notes 8.1-8.3.5

L07 Sequential logic 2	Chapter 14, 14.1-14.3; Chapter 15, 15.1-15.3		Minispec sequential tutorial
L08 Pipelining	Chapter 23, 23.1-23.3		Notes 11.5-11.7
L09 Design tradeoffs	Chapter 23, 23.4-23.5		Notes 12.3
L10 Compilers and Assembly		Chapter 2, 2.1-2.3, 2.5-2.7, 2.10	
L11 Single-cycle processor		Chapter 4, 4.1-4.4	
L12 The memory hierarchy		Chapter 5, 5.1-5.3	L14 notes, up to slide 24
L13 Caches		Chapter 5, 5.3-5.4, 5.8	L14 notes, slides 25-40
L14 Pipelined processors 1		Chapter 4, 4.5-4.6	
L15 Pipelined processors 2		Chapter 4, 4.6-4.8 (until page 309)	
L16 Operating systems		Chapter 4, 4.9; Chapter 5, 5.6	
L17 Virtual memory 1		Chapter 5, 5.7	VM lecture notes
L18 Virtual memory 2		Chapter 5, 5.7	VM lecture notes
L19 Exceptions and I/O			
L20 Synchronization			L19 notes
L21 Cache coherence		Chapter 5, 5.10	L21 notes, slides 23-27
L22 Parallel Processing			
L23 Modern Processor Architecture - Branch prediction		Chapter 4, 4.8 (pages 310-315)	