Electronics
EE3C11
(Introduction)

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Anton Montagne

Marion de Vlieger

Building the “bridge”

Semiconductors

Circuits

Specifications come from the top

Hardware comes from the bottom

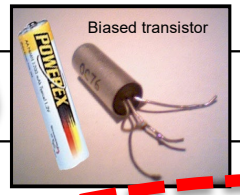
Show-stoppers come from the bottom

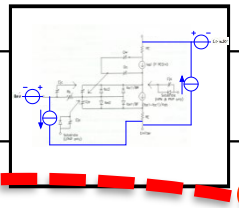
Top-down design

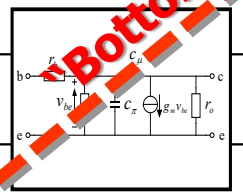
Customer

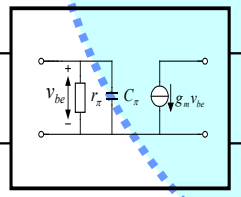
Design Methodology

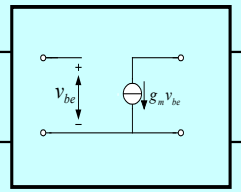
“Bottom-aware top-down design”

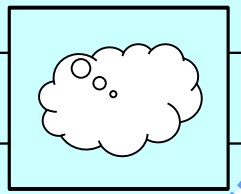












Bottom-up design

Content

This course is about

Technology aware

Design Methodology

Books

Electronics

Structured Electronic Design
Edition 1.2
A. Montagne
This book is available at:
ETV DESK!

Semiconductors

Semiconductor Physics and Devices; Basic Principles
Donald A. Neamen
McGraw-Hill International Edition, (4th edition)
This book is available at the ETV desk.
(Limited number. <20, more are ordered)

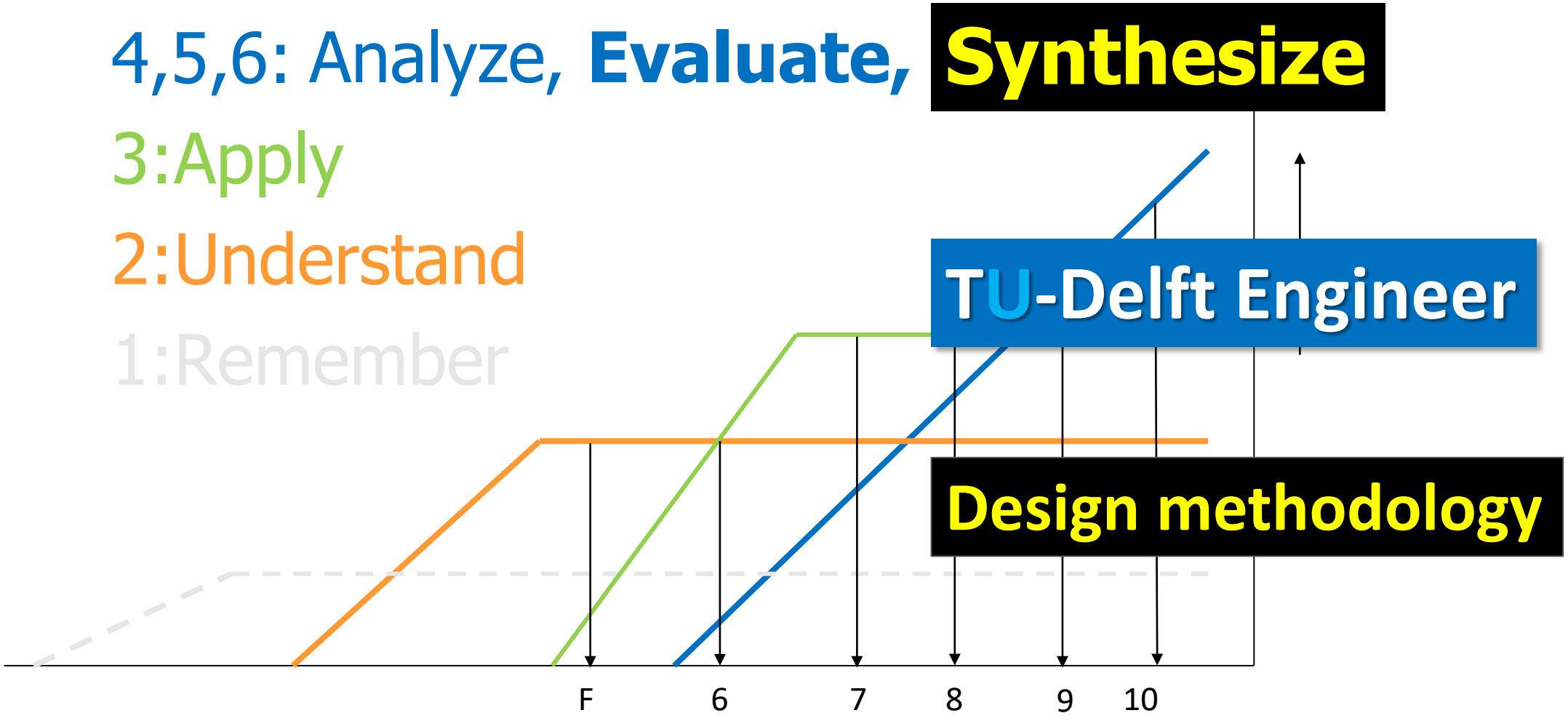
Bloom for engineers

4,5,6: Analyze, **Evaluate,** **Synthesize**

3:Apply

2:Understand

1:Remember



Traditional Bloom Cycle for **Electronic Engineers**

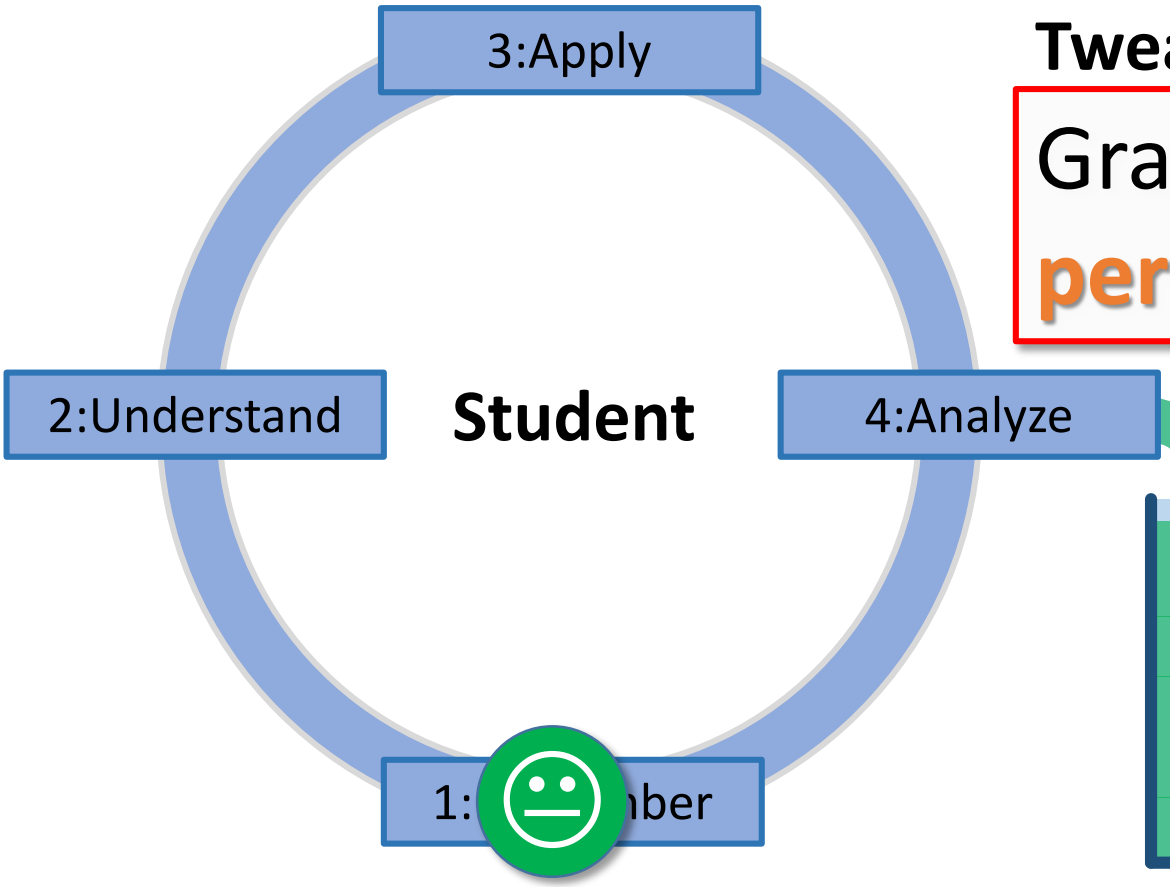
Active education until level 4

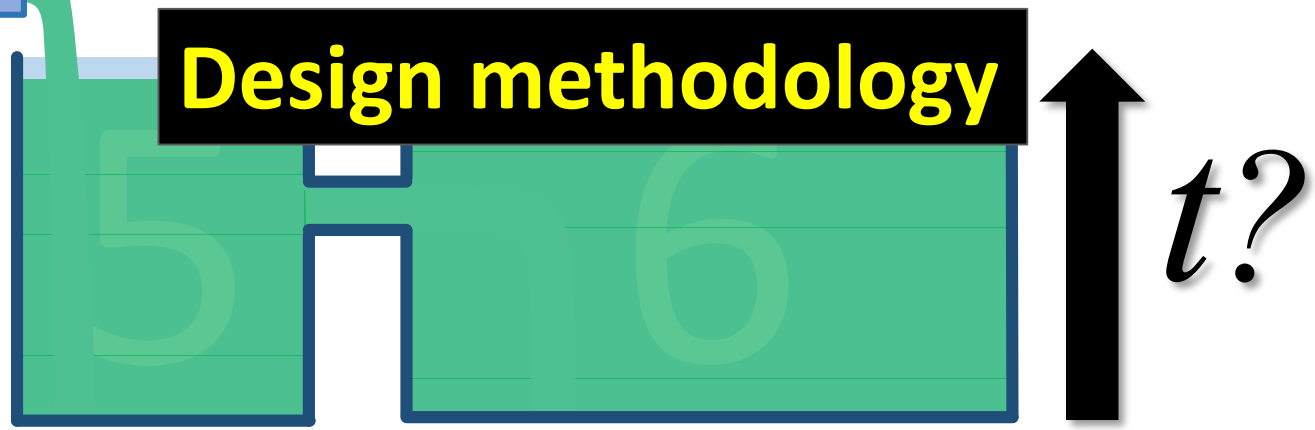
Repeat existing designs

Analyze results

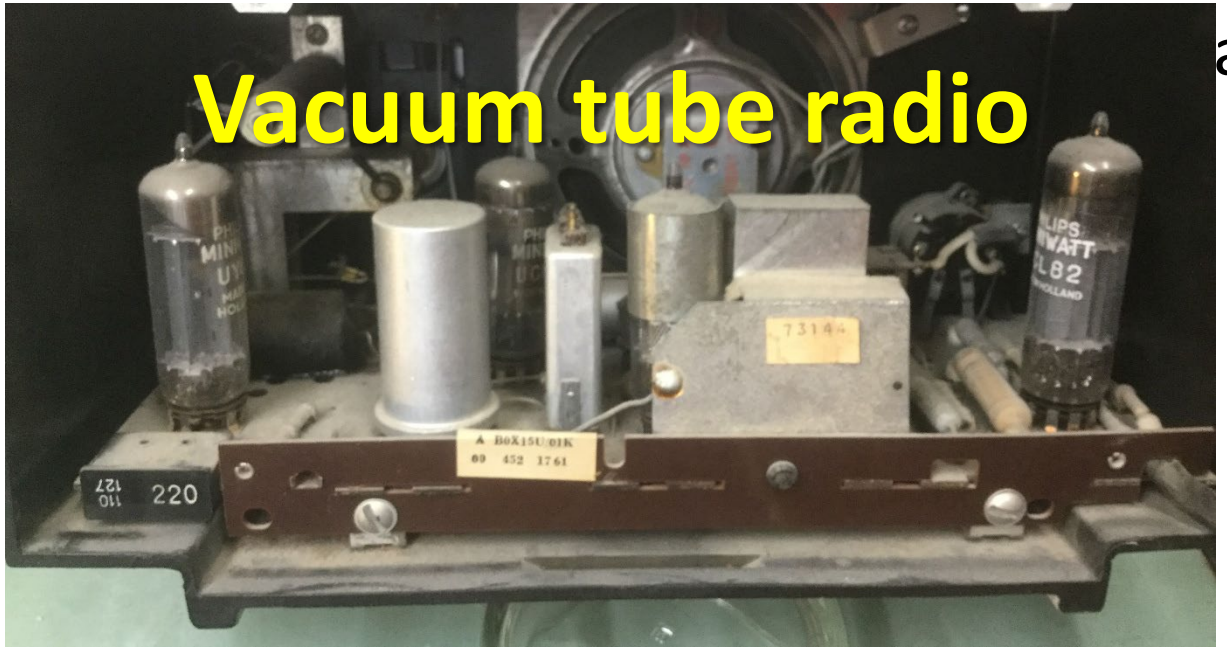
Tweak designs to meet specs

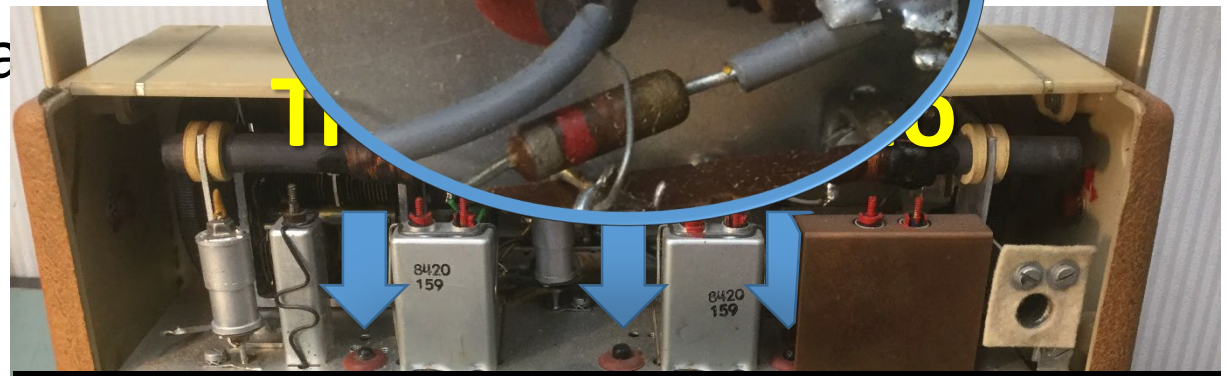
Gradually develop a **personal** **design methodology**






Repeat
Analyze
Tweak
“Experience”



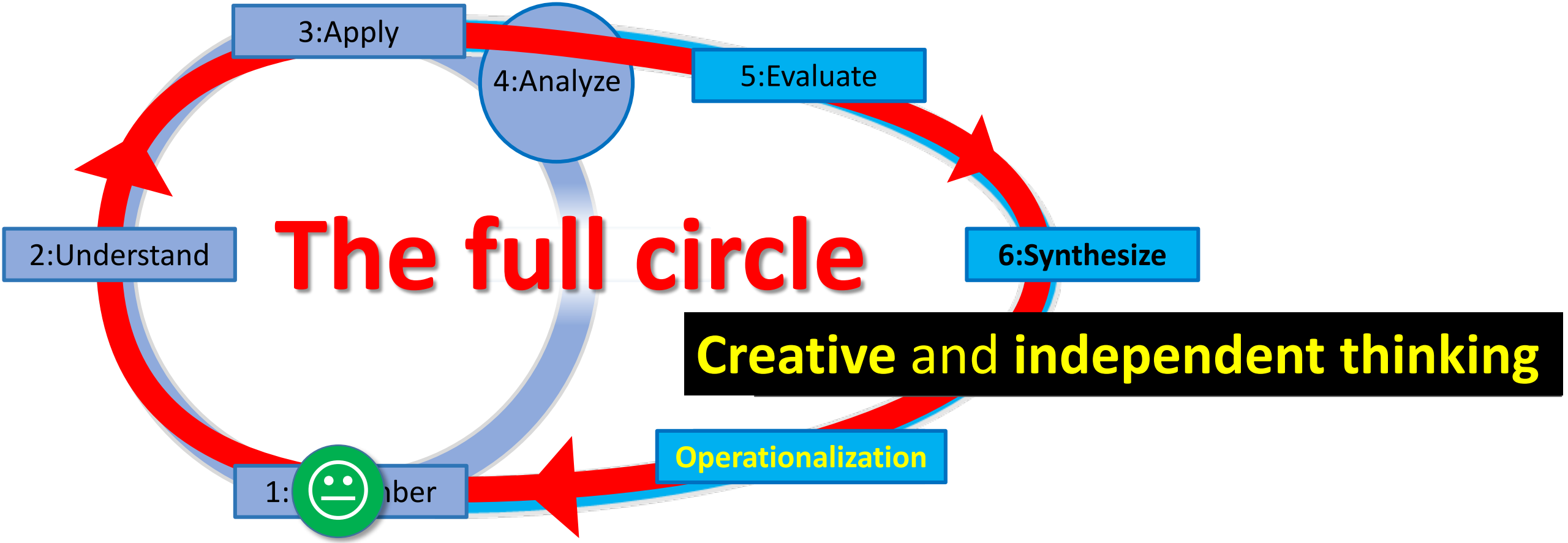


Transistor technology

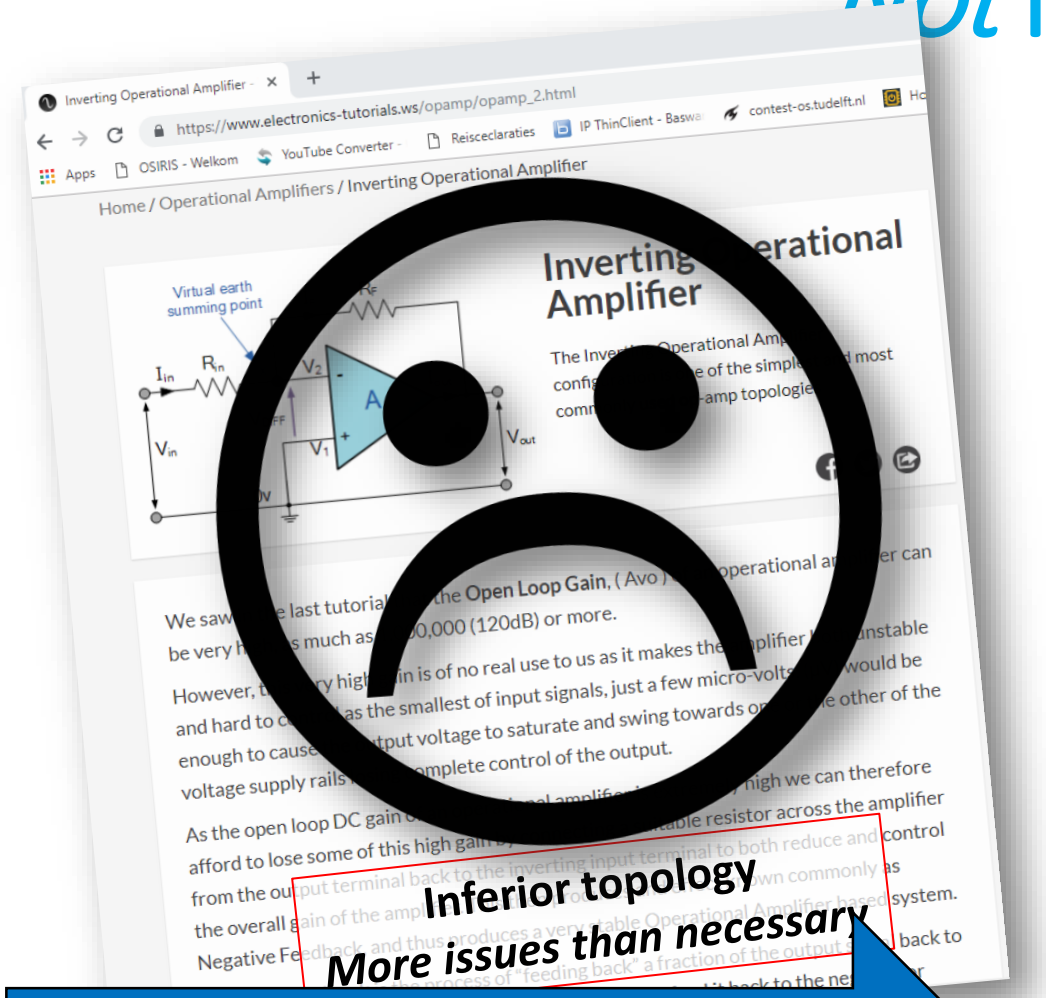
Vacuum tube architecture

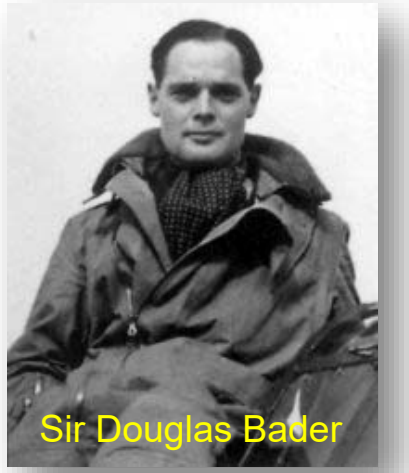
Bloom Cycle for **Innovators**

Active education including level 5 and 6 **and operationalization**



Not in this course





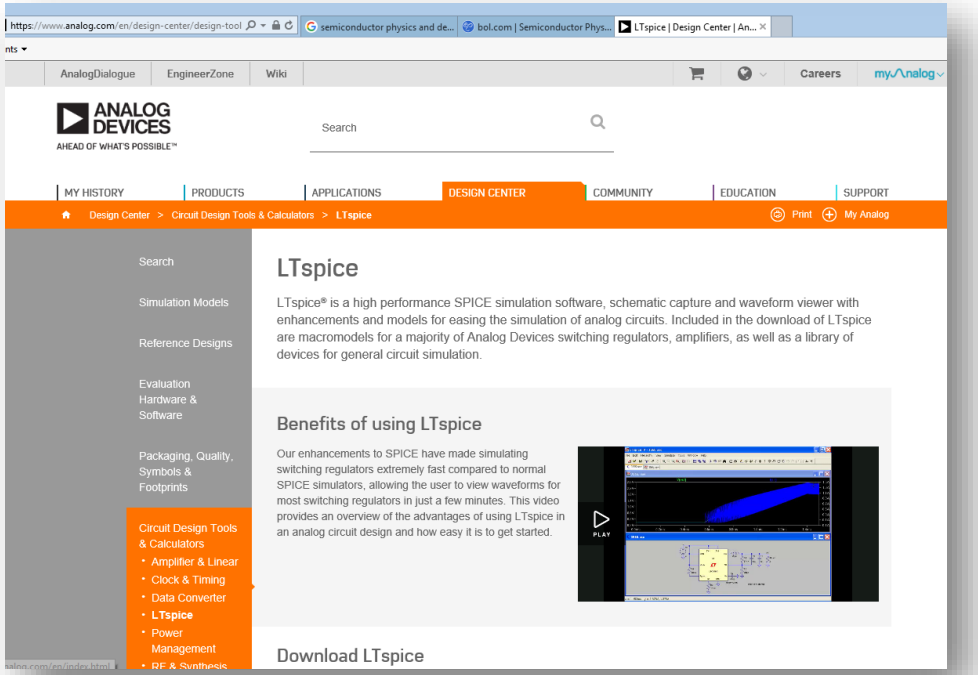
"Rules are for the guidance of the wise men - and for the obedience of fools"

Creative and **independent thinking**

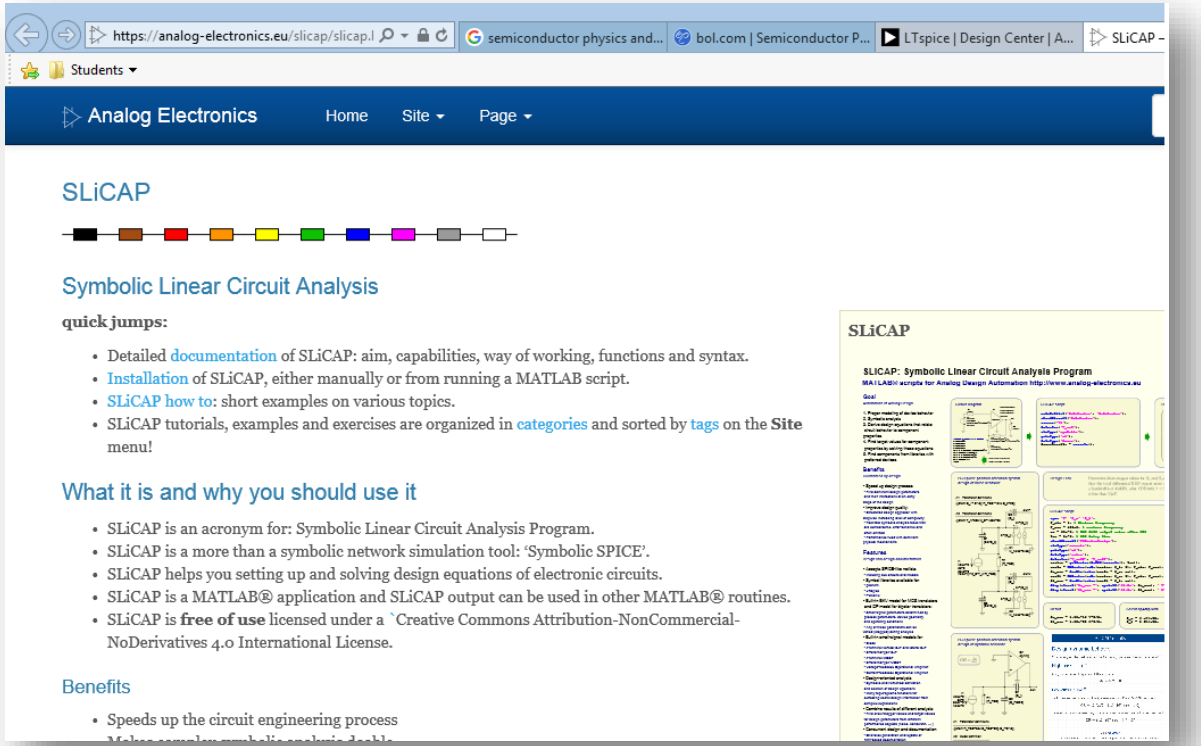
HOW? : Create a design *yourself*

Operationalization

Software



LTspice®: Simulation, Schematic capture and **Waveform viewer**



SLiCAP : To set up and solve Design Equations of electronic circuits.

To create design documentation

(SLiCAP is a MATLAB® application: you need a laptop with MATLAB®)

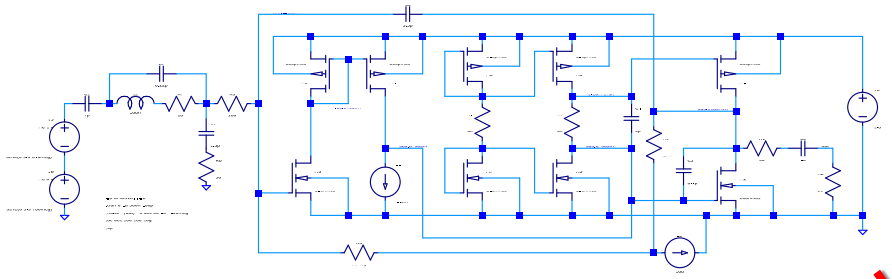
HOW? : Create a design *yourself*

LTspice and **SLiCAP**

This course and related courses

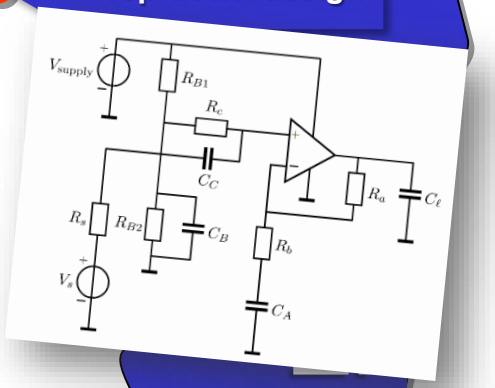
Semiconductors

Circuits



EE3C11

Top-down design



EE4109

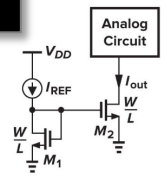
EE4C10

ET8011MSC

(masterclass)

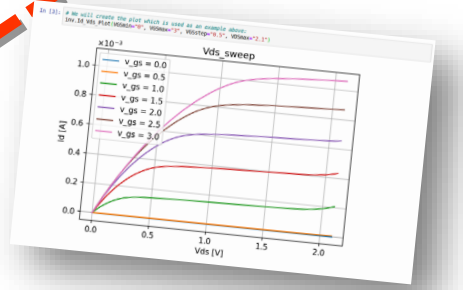
EE3C11

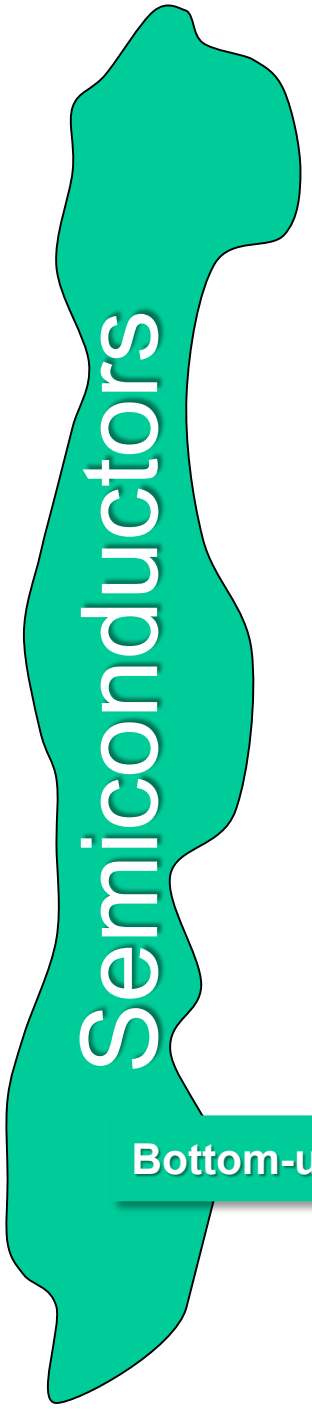
Bottom-up design



$$I_{REF} = \frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_1 (V_{GS} - V_{TH})^2$$

$$I_{out} = \frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_2 (V_{GS} - V_{TH})^2 \Rightarrow I_{out} = \frac{(W/L)_2}{(W/L)_1} I_{REF}$$



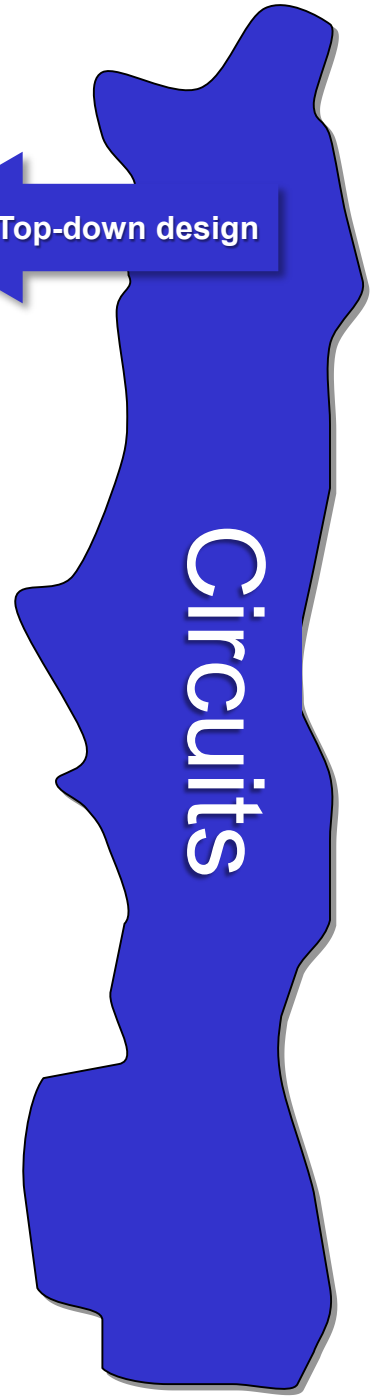


Schedule

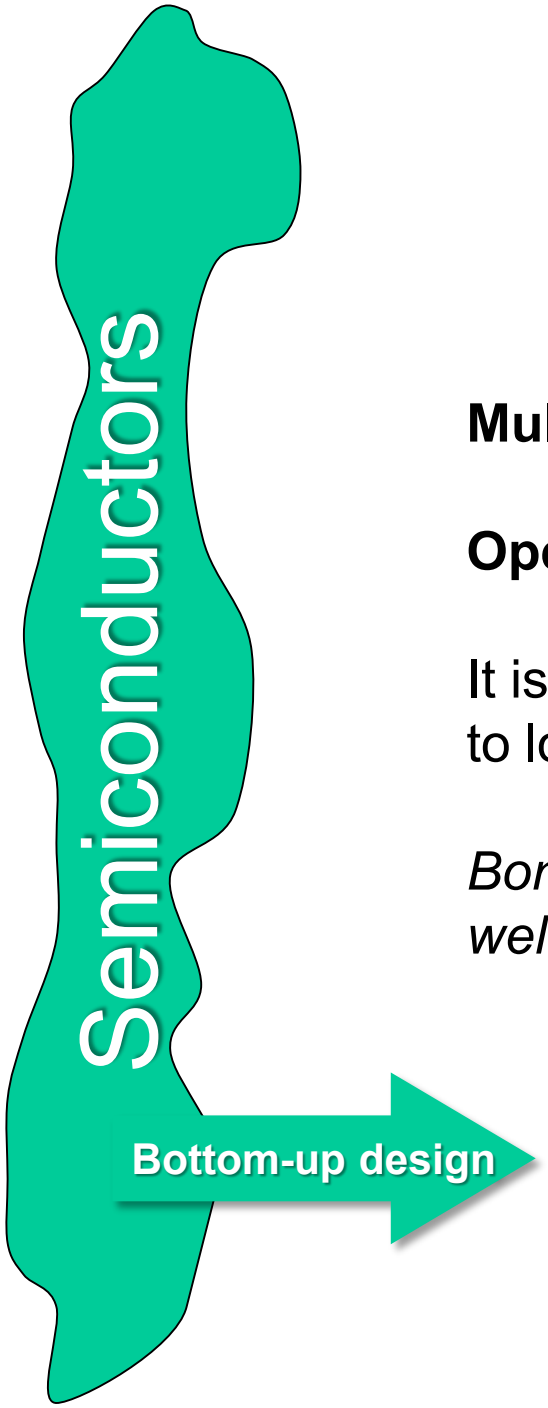
Name	Date	Time	Location
Electronics 1	Monday, February 10, 2020	10:45 - 12:45	D@ta
Electronics 2	Tuesday, February 11, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, February 13, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Semiconductors 1	Monday, February 17, 2020	10:45 - 12:45	D@ta
Electronics 3	Tuesday, February 18, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, February 20, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Electronics 4	Monday, February 24, 2020	10:45 - 12:45	D@ta
Semiconductors 2	Tuesday, February 25, 2020	15:45 - 17:45	**Boole**
Instructions	*Thursday, February 27, 2020*	*10:45 - 12:45*	***Pulse-Hall 8***
Semiconductors 3	Monday, March 2, 2020	10:45 - 12:45	D@ta
Electronics 5	Tuesday, March 3, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, March 5, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Electronics 6	Monday, March 9, 2020	10:45 - 12:45	D@ta
Semiconductors 4	Tuesday, March 10, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, March 12, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Electronics 7	Monday, March 16, 2020	10:45 - 12:45	D@ta
Electronics 8	Tuesday, March 17, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, March 19, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Electronics 9	Monday, March 23, 2020	10:45 - 12:45	D@ta
Electronics Practical	***Tuesday, March 24, 2020***	***08:45 - 10:45***	***Tellegen Hall practicumzaal 1***
Electronics 10	Tuesday, March 24, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, March 26, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Semiconductors 5	Monday, March 30, 2020	10:45 - 12:45	D@ta
Semiconductors 6	Tuesday, March 31, 2020	15:45 - 17:45	Ampere
Instructions	*Thursday, April 2, 2020*	*10:45 - 12:45*	*Pulse-Hall 3*
Electronics 11	Tuesday, April 7, 2020	10:45 - 12:45	**Chip**
Instructions	*Thursday, April 9, 2020*	*08:45 - 10:45*	*Pulse-Hall 3*
Electronics 12	Thursday, April 9, 2020	10:45 - 12:45	**Pi**

Bottom-up design

Top-down design



Exam



Multiple choice

Open book (course books, handouts and the slides)

It is allowed to use a laptop or tablet (IN FLIGHTMODE) to look at the slides and handouts.

Bonus point for completed design assignment, well documented in SLiCAP