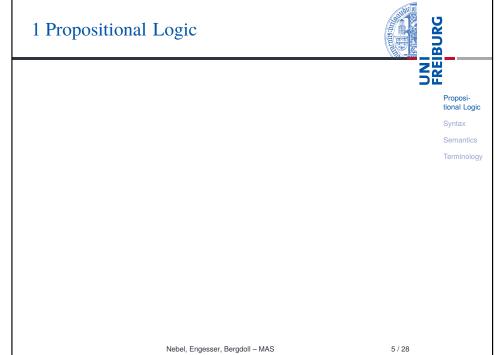
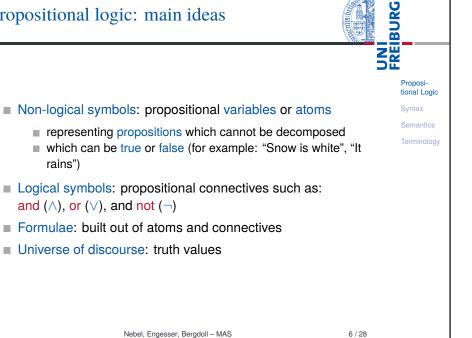
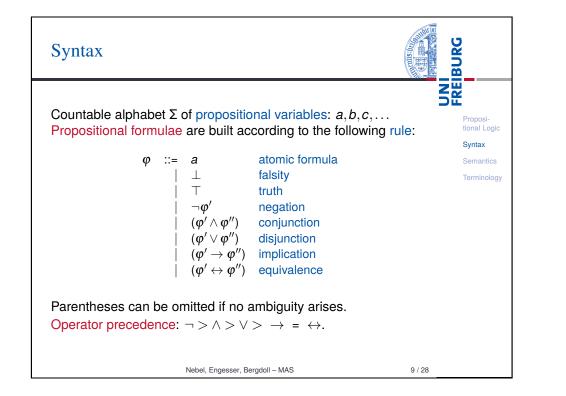


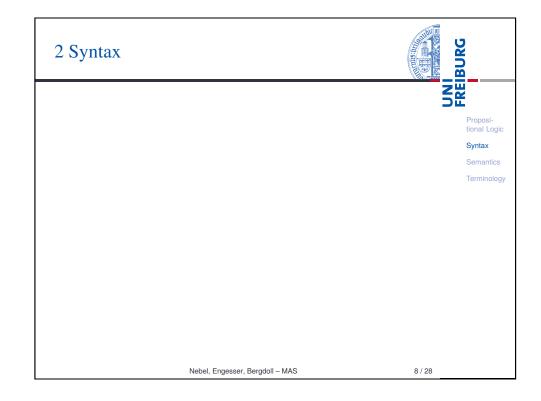
The logical approach	BURG
	FREI
Define a formal language: logical & non-logical symbols, syntax rules	Proposi- tional Logic Syntax
Provide language with compositional semantics:	Semantics
<ul> <li>Fix universe of discourse</li> <li>Specify how the non-logical symbols can be interpreted: interpretation</li> <li>Rules how to combine interpretation of single symbols</li> <li>Satisfying interpretation = model</li> <li>Semantics often entails concept of logical implication / entailment</li> </ul>	Terminolog
Specify a calculus that allows to derive new formulae from old ones – according to the entailment relation	
Nebel, Engesser, Bergdoll – MAS 2 / 28	

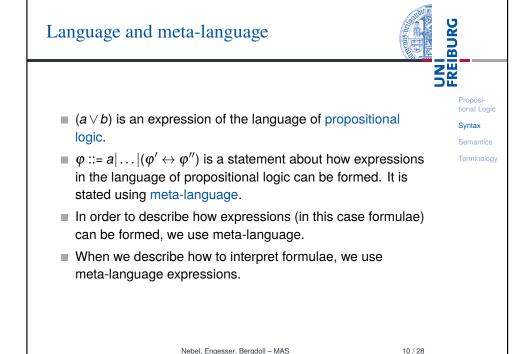


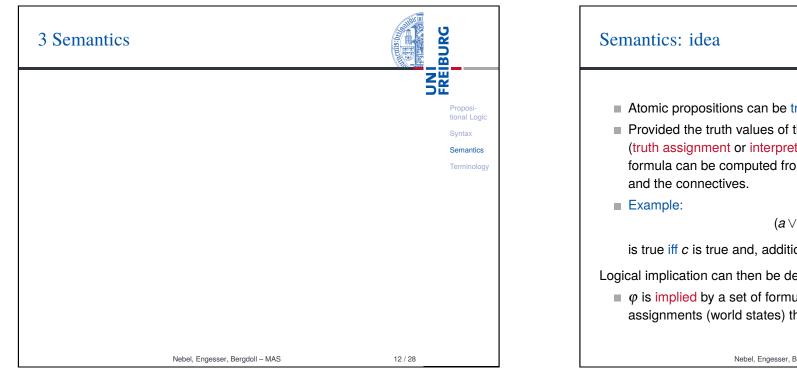
## Propositional logic: main ideas

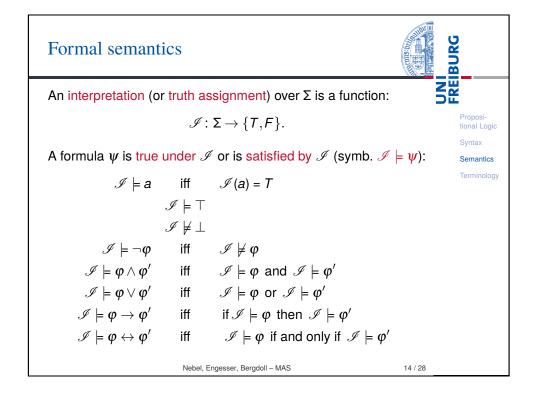


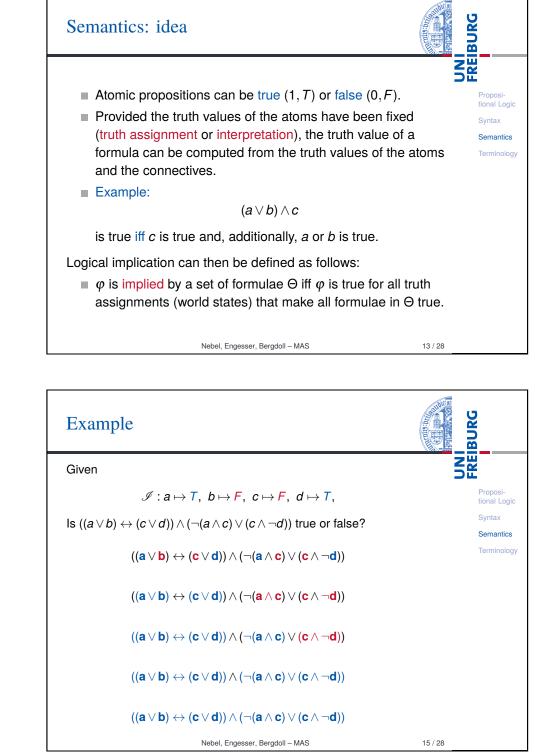




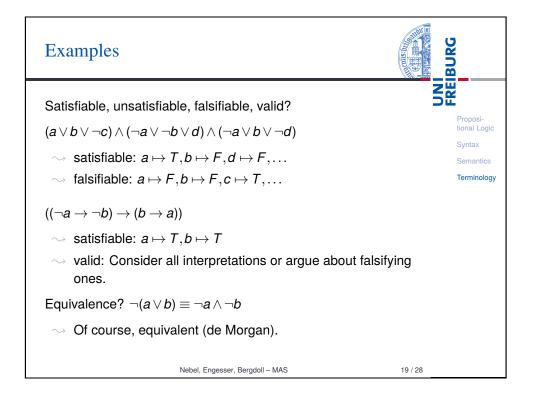


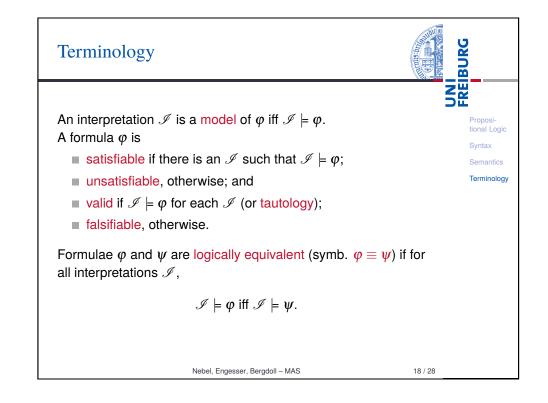


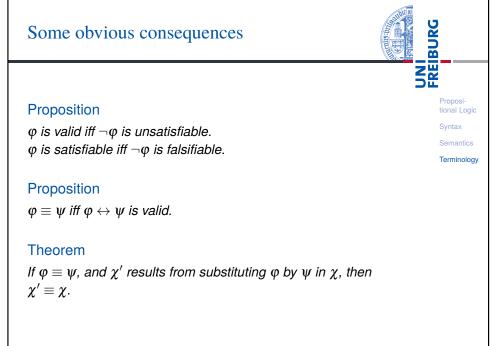




4 Terminology	FREBURG
	DE Proposi-
	tional Logic
	Syntax
	Semantics
	Terminology
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Nebel, Engesser, Bergdoll - MAS

Some equiv	alences						BURG
simplifications	$arphi  ightarrow \psi$	≡	$ eg \phi \lor \psi$	$\phi \leftrightarrow \psi$	≡	$egin{array}{lll} (arphi  ightarrow arphi) \wedge \ (arphi  ightarrow arphi)  ightarrow arphi) \end{array}$	Proposi- tional Logic
idempotency	$\boldsymbol{\varphi} \lor \boldsymbol{\varphi}$	$\equiv$	φ	$oldsymbol{arphi}\wedgeoldsymbol{arphi}$	$\equiv$	(1 1)	Syntax
commutativity			$\psi \lor \varphi$			$\psi \wedge \varphi$	Semantics
associativity				$(\varphi \wedge \psi) \wedge \chi$	$\equiv$	$\varphi \wedge (\psi \wedge \chi)$	Terminology
absorption	$\varphi \lor (\varphi \land \psi)$	$\equiv$	φ	$\boldsymbol{\varphi} \wedge (\boldsymbol{\varphi} \lor \boldsymbol{\psi})$	$\equiv$	φ	
distributivity	$\varphi \wedge (\psi \lor \chi)$	$\equiv$	$(oldsymbol{arphi}\wedgeoldsymbol{\psi})arphi$	$\varphi \lor (\psi \land \chi)$	$\equiv$	$(arphi ee \psi) \land$	
			$(arphi \wedge \chi)$			$(arphi ee \chi)$	
double negation	$ eg \neg \varphi$	$\equiv$	$\varphi$				
constants	$\neg \top$	$\equiv$	$\perp$	$\neg \bot$	$\equiv$	Т	
De Morgan	$ eg( \varphi \lor \psi )$	$\equiv$	$ eg \phi \land  eg \psi$	$ eg( \varphi \wedge \psi )$	$\equiv$	$\neg \phi \lor \neg \psi$	
truth	arphi ee  o  o	$\equiv$	Т	$oldsymbol{arphi}\wedge op$	$\equiv$	φ	
falsity	$\phi \lor \bot$	$\equiv$	$\varphi$	$\phi \wedge \bot$	$\equiv$	$\perp$	
taut./contrad.	$oldsymbol{arphi} ee  eg  abla ee \phi$	$\equiv$	Т	$oldsymbol{arphi}\wedge eg \phi$	$\equiv$	$\perp$	
	Neb	el, Enç	gesser, Bergdoll – M	AS		21 / 28	

