Theme of Lecture	Topics in class (videos numbered)	
Lecture 5A: Models as epistemic tools Lecture 5B: Methodologies in the Engineering Sciences	**5A Models as epistemic tools** **5.1** Overcoming a naïve picture of how science is applied in engineering by understanding methodological and cognitive strategies in science. **5.2** Introduction: The concept of *Models as Epistemic Tool* as a means to think about scientific knowledge at a meta-level (across scientific disciplines). **5.3** How do we construct models that explains the observed phenomena in case the model goes beyond mathematical deduction from basic laws? **5.4** Explaining the aspects of the B&K tool: The roles of scientific reasoning, epistemic criteria, measurements and theory playing a role in how we construct scientific models. **5.5** The B&K tool as a strategy for (re-)constructing relevant aspects of scientific models and modelling.. **5.6** Applying the B&K tool to reconstruct the ('constructed' and published) scientific model that explains the observed phenomenon of sono-luminescence. **5.7** How the B&K tool accounts for the construction of scientific models (that explain phenomena), and how it is part of the general HD-method of scientific research. **5B: Methodologies in the Engineering Sciences** **5.8** Introducing the final assignment: using the B&K tool in analyzing a scientific article. **5.9** What is engineering science? A definition: How engineering science differs from other natural sciences, and how researchers tend to talk about the technological application only (example of Pammography). **5.10** An example of how a technological design problem (in bioleaching) is translated into scientific research project. **5.11** Applying the B&K tool - steps i, iv, v &vii: What is/are the phenomena relevant to this technology? Which measurements and knowledge do we have about the phenomenon, and what are relevant physical circumstances. **5.12** How to translate a technological problem into a scientific research project: trial and error solutions versus fundamental understanding. **5.13** How do we construct a scientific model that explains the (technologically important) phenomenon? **5.14** Scientific breakthroughs: The role of new measurement methods and experimental techniques (related to step v in B&K). **5.15** The discovery and the new scientific model (related to steps ii and vii in B&K).	**Readings after video lecture (= preparation for tutorial)** Slides + notes of class 5. Handout on B&K theory Prepare Final assignment EE&AM (analysis of a scientific article).