Kurzus kódja: BMI-LOTD-351E.07, BMA-LOTD-351.07
Title of course: Modal logic
Kurzus megnevezése angolul: Modal logic
Location and time: i/224, Thursday 12:00 - 13:30
Kurzus előadója: William Brown

Exam requirements:

- For the oral exam: Understanding of the material covered in class and the main concepts (modal languages, modal logic, Kripke semantics, algebraic semantics, completeness and incompleteness results, ...).
- Presentation: Elaboration and presentation of a small original research work related to the course.

Content of the course:

Propositional modal logics constitute a very large family of logical systems. In this course, we will study various classes of propositional modal logics and languages. Specific logical systems will be discussed as examples, but as much as we can, we will stay at the more general level of classes of logics and languages; proving theorems about these classes rather than individual logics.

After introducing modal languages, we will study Kripke semantics (which uses frames to interpret modal languages). We will then discuss completeness results for Kripke semantics, as well as the limitations inherent to this kind of semantics, which leads to some incompleteness results for various modal logics (wrt to Kripke semantics).

We will then introduce a different kind of semantics with which we can interpret modal languages, algebraic semantics, which yields more general completeness results. We will see that this kind of algebraic semantics provides us with completeness results for every normal modal logic of arbitrary similarity type (Jónsson–Tarski theorem).

If we have time we will discuss modal correspondence theory which shows that propositional modal logics, are able to express certain 1st- and 2nd-order properties.

This course is suitable as an introduction to modal logic.

Method of evaluation: Oral exam or presentation at the end of the semester

Literature:

- Blackburn, P., Rijke, M. de., Venema, Y., *Modal Logic*. Cambridge tracts in theoretical computer science 53, 2001.
- Beal, J.C., Frassen, van B.C., *Possibilities and Paradox: An Introduction to modal and many-valued logic*. Oxford University Press, 2003.
- Fine, K., *An incomplete logic containing S4*. Theoria 40:23–29, 1974.

- Thomason, *An incompleteness theorem in modal logic*. Theoria, 40:150–158, 1974.