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Techniques and methods to guarantee Bologna-conform higher education in GNSS

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The Bologna Declaration is aiming for student-centered, outcome-related, and competence-based teaching. In order to fulfill these demands, deep level learning techniques should be used to meet the needs of adult-compatible and self-determined learning.

The presentation will summarize selected case studies carried out in the framework of the lecture course "Introduction into GNSS positioning" of the Geodetic Institute of the Karlsruhe Institute of Technology (Karlsruhe, Germany). The lecture course "Introduction into GNSS positioning" is a compulsory part of the Bachelor study course "Geodesy and Geoinformatics" and also a supplementary module of the Bachelor study course "Geophysics". Within the lecture course, basic knowledge and basic principles of Global Navigation Satellite Systems, like GPS, are imparted.

The lecture course was migrated starting from a classically designed geodetic lecture course, which consisted of a well-adapted combination of teacher-centered classroom lectures and practical training (e.g., field exercises). The recent Bologna-conform blended learning concepts supports and motivates students to learn more sustainable using online and classroom learning methods. Therefore, an appropriate combination of
- classroom lectures: Students and teacher give lectures
- practical training: Students select topics individually
- online learning: ILIAS (learning management system) is used as data, result, and communication platform.

The framing didactical method is based on the so-called anchored instruction approach. Within this approach, an up-to-date scientific GNSS-related paper dealing with the large-scale geodetic project "Fehmarn Belt Fixed Link" is used as anchor. The students have to read the paper individually in the beginning of the semester. This enables them to realize a lot of not-known GNSS-related facts. Therefore, questions can be formulated. The lecture course deals with these questions, in order to answer them. At the end of the lecture course, the author of the scientific paper gave a concluding lecture.

Within the presentation, the didactical concept of the enriched blended learning approach is discussed in detail in order to gain insight into the didactical design of the lecture course and the higher education principles taken into account in order to guarantee Bologna-conform teaching and learning.