FLEXIBLE LEARNING AND ASSESSMENT IN ENGINEERING PHYSICS

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Students sometimes perceive the engineering physics courses as abstract and disconnected from professional practice. At the same time, increasingly diverse student cohorts, including Finnish- and English-language degree programmes, require more flexible and inclusive instructional designs. This paper presents a course implementation that combines modular learning pathways, strategic assessment, and application-oriented content.

The course "Engineering physics 2" consists of eight topics organised into a branching structure. A mandatory foundation in quantum physics is followed by two thematic branches: (A) radiation and nuclear physics, and (B) semiconductor physics. In addition, two independent topics: sound and acoustics, and energy efficiency in buildings, focus on workplace-relevant applications. Students freely choose their learning paths beyond the core, supporting autonomy and motivation [1]. This is the third year this course has been implemented, and the course structure and covered topics included have evolved along the way. Course attendance has increased each year, and this has raised demand for a broader selection of topics and a more elective course structure.

Assessment is designed to encourage broad engagement. The final exam includes eight questions (one per topic), from which students answer four. The possibility to choose reduces performance pressure and supports mastery-oriented learning in line with assessment-forlearning principles [2] and constructive alignment [3]. The assessment only requires studying half of the topics offered in the course, but students have the option to study more if they have an interest in doing so.

The pedagogical approach combines lectures with small-group measurement, modelling, and project work. The project component allows students to pursue experimental, simulationbased, or literature-based investigations on topics of their choice. Regardless of format, projects require a clear theoretical background, methodological description, analysis of results, and justified conclusions. This structure strengthens the connection between theoretical physics and real-world applications while supporting active learning practices [4].

As the course is currently ongoing, systematic data is not yet available. Initial observations suggest that students make diverse, interest-driven topic selections and engage broadly with course content.

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