*Секція 1*

***Електротехніка, електромеханіка і електротехнології***

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## ENERGY EFFICIENT LIGHTING SYSTEM IN EDUCATIONAL CLASSROOMS

Lighting is and always has been an important factor in designing and operating educational classrooms. Until the 1950s, natural light predominated as a means of illuminating most university spaces [1]. Classroom design was based in large part on time-honored relationships between window sizes and room dimensions. As electric power costs declined and designers began to take advantage of the increased flexibility provided by electric lighting, daylighting took a secondary role. Now, highly energy efficient windows and skylights and a renewed recognition of the positive psychological and physiological effects of daylighting allow a healthy and economical mix of natural and electric illumination in new and renovated educational classrooms.

Research has consistently shown that academic off-task behaviour, absences, and depression all decrease with greater amounts of natural light [3]. Students were found to perform significantly better on standardized tests in classrooms where windows and skylights let more daylight in the classroom [2]. It is also important to use a combination of indirect and task lighting or consider newer direct/indirect lighting systems to enhance illumination levels for reading and to reduce glare on computer monitors. Adjustable lighting controls provide greater options in lighting levels throughout the classroom. In addition, all windows and skylights should be equipped with blinds.

Consideration should also be given to energy efficiency. Energy-efficient light fixtures, motion detectors that turn on and off classroom lights based on movement, and electronic daylight sensors that decrease illumination levels when natural light increases can have a long-term impact on maintenance and energy costs. New light sources such as light-emitting diodes (LEDs) and induction lamps may ultimately change the way we approach lighting. The only current practical application of LED technology, however, is for exit and directional signs, and induction lamps are cost effective only when used in places that are difficult and costly to maintain (induction lamp life is generally five times longer than the best fluorescent lamps). A few other sources might be considered for special applications, such as cold cathode lighting, neon, and fiber optics, but, if used extensively, these sources will generally prove to be costly and comparatively inefficient.

By following the six steps below, it is possible to design lighting systems that use half the energy conventional designs used just a few years ago:

1. Use daylighting strategies throughout the university.
2. Select the best light source suitable for the application.
3. Use the most efficient luminaires.
4. Use luminaires that produce a good coefficient of utilization.
5. Use modern lighting controls throughout the university.

It may be more useful to think of the educational classroom as a living room, interactive museum, or library where knowledge is discussed and discovered rather than a space where information is simply transferred from teachers to students. Educational designers have a duty to foster a creative and engaging learning environment. With the continued expansion of technology into the learning process, flexible and thoughtful educational classroom designs should be the rule rather than the exception.

**References:**

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## ЕКСПЕРЕМЕНТАЛЬНІ ДОСЛІДЖЕННЯ ПО ТРИВАЛОМУ ЗБЕРІГАННЮ ЯБЛУК ОБРОБЛЕНИХ ЕЛЕКТРОМАГНІТНИМ ВИПРОМІНЮВАННЯМ

Метою експериментальних досліджень було підтвердження біотропних параметрів елекромагнітного випромінювання по обробці яблук для інгібування синтезу етилену. З аналізу літературних джерел слідує, що значна частка втрат плодів (до 40%) у період зберігання припадає на поразку їх фізіологічними