Horizontal Illuminance — Desk/Task (lx)

Visual performance and non-visual support

Definition

Illuminance on the working plane (desks). Adequate levels support reading speed, error reduction, and comfort.

Recommended Ranges

|  |  |
| --- | --- |
| Optimal | 300–500 lx general classrooms; 750–1000 lx short-term exams/labs (with glare control). |
| Caution | 200–299 lx (strain risk); >1000 lx (glare if uncontrolled). |

Biological Effects

Hormones (Endocrine)

Higher daytime illuminance → stronger ipRGC drive → melatonin suppression; supports morning cortisol amplitude.

Adequate light supports serotonin turnover and overall mood/attention.

Skin (Photobiology & Peripheral Clocks)

Indoor electric light (no UVB) → negligible vitamin D effect.

Nervous System (ipRGC → SCN → CNS)

Greater retinal drive → SCN stability → improved vigilance and executive function.

Supports prefrontal dopamine tone, reducing errors and enhancing working memory.

Biochemical Pathways (Mechanistic Detail)

ipRGC glutamate/PACAP → NMDA-Ca²⁺→CREB→Per gene expression; SCN synchronizes peripheral clocks via AVP/VIP/GABA.

Daylight components (when present) further reinforce circadian amplitude.

Classroom Recommendations

Design for 300–500 lx at desks with uniformity ≥0.6.

Use boost scenes (750–1000 lx) for exams; manage glare and flicker.

Quick Checklist

Lux measured across multiple desks and rows.

Uniformity and contrast to board verified.

References

EN 12464-1 — Classroom illuminance and uniformity.

Park et al. — Illuminance and alertness/performance.