

## **Biochemical Approach to Renewable Energy: Enhancing Students' Perception and Understanding of Science of Energy through Integrated Hands-On Laboratory**

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**Abstract :** Acute power shortage in Pakistan requires an urgent attention to take preliminary steps to spread energy awareness at all levels. One such initiative is taken at Habib University (HU), Pakistan, through renewable energy course, one of the core offerings, where students are trained to investigate various aspects of renewable energy concepts. The course is offered to all freshmen enrolled at HU regardless of their academic backgrounds and degree programs. A four-credit modular course includes both theory and laboratory elements. Hands-on laboratories play an important role in science classes, particularly to enhance the motivation and deep understanding of energy science. A set of selected hands-on activities included in course introduced students to explore the latest developments in the field of renewable energy such as dye-sensitized solar cells, gas chromatography, global warming, climate change, fuel cell energy and power of biomass etc. These projects not only helped HU freshmen to build on energy fundamentals but also provided them greater confidence in investigating, questioning and experimenting with renewable energy related conceptions. A feedback survey arranged during and end of term revealed the effectiveness of the hands-on laboratory to enhance the common understanding of real world problems related to energy such as awareness of energy saving, the level of concern about global climate change, environmental pollution and science of energy behind the energy usage.

**Keywords :** biochemical approaches, energy curriculum, hands-on laboratory, renewable energy

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