# MODULE HANDBOOK DESCRIPTION

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| Module designation | Renewable Energy Conversion | |
| Code | FBA3210 | |
| Semester(s) in which the module is taught | 6 / third year | |
| Person responsible for the module | Agung Budi Muljono, ST., MT. | |
| Language | Indonesian | |
| Relation to curriculum | Concentration Elective for Electrical Power System Engineering | |
| Teaching methods | Lectures, case base method, project base method | |
| Workload (incl. contact hours, self-study hours) | Contact minutes every week, each week of the 16<br>Weeks / semester:<br>• Lectures: 2 × 50 minutes.<br>• Exercises and Assignments: 3 × 60 minutes.<br>• Self-learning: 2 × 60 minutes.<br>Total study hours = 5 hours 40 minutes/week | |
| Credit points | 2 SKS (~ 3.6 ECTS) | |
| Required and recommended prerequisites for joining the module | Engineering Economics (FBS2236)<br>Hydro Thermal Energy Conversion (FBA3103) | |
| Module objectives/intended learning outcomes | 1. Students are able to relate government policies regarding renewable energy to the potential of renewable energy in Indonesia. Analysis of energy conversion and diversification processes, water energy conversion, PLTMH power potential, solar energy (PV) technology, bioenergy technology (biomass, biogas and biofuel), geothermal energy and energy conversion storage technology (batteries and converters). | PLO3 |
| | 2. Students are able to design electrical systems from solar energy sources and alternative energy-based hybrid energy systems based on HOMER (Hybrid Optimization of Multiple Energy Resources) software. | PLO4 |

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| | 3. Students are able to carry out experiments measuring the potential of renewable energy to get experience getting renewable energy data directly in the field. | PLO5 |
| Content | 1. Introduction to the concept of renewable energy, global, regional and local energy conditions, national energy policy.<br>2. Micro hydro energy technology.<br>3. Solar energy (PV) technology.<br>4. Wind energy technology.<br>5. Bio energy technology (Biomass, biogas and biofuel).<br>6. Geothermal energy technology (geothermal).<br>7. Other alternative energy technologies (Nuclear, Ocean Energy, Hydrogen).<br>8. Energy storage and conversion technology (battery and converter).<br>9. Planning for an off-grid fan on-grid hybrid renewable energy-based electrical system.<br>10. Study of the technical economic value of renewable energy systems and evaluation of renewable energy projects. | |
| Examination forms | - Written case study<br>- Written and oral project study<br>- Essay midterm and final test | |
| Study and examination requirements | The final grade in the module is composed of;<br>a. Case I assessment: 15 %<br>b. Case II assessment: 15 %<br>c. Case III assessment: 20 %<br>d. Written Midterm assessment: 20 %<br>e. Written Final assessment: 30 %<br>Students must have a final grade of 65% or higher to pass | |

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| Reading list | **1.** Mehmet Kanoğlu, Yunus A. Çengel and John M. Cimbala, 2020, "Fundamentals and Applications of Renewable Energy", McGraw-Hill Education, New York.<br>**2.** D. Yogi goswami and Frank kreith, 2016. "Energy Efficiency and Renewable Energy Handbook", CRC Press, Taylor & Francis Group, Florida.<br>3. Kementerian Energi Dan Sumber Daya Mineral, 2019, "Kebijakan Nasional Energi Baru Terbarukan Dan Konservasi Energi", Direktorat Jenderal Energi Baru Terbarukan Dan Konservasi Energi, Jakarta<br>4. Carepi, 2007 "Hand-out Pelatihan MHPP", ECN, GTZ and Senter Novem, Netherland.<br>5. IMIDAP. 2009. Buku Utama Pedoman Studi Kelayakan PLTMH. Jakarta: Direktorat Jenderal Listrik dan Pemanfaatan Energi Departemen Energi dan Sumber Daya Mineral.<br>6. Waldiyono, MS, 2008, "Ekonomi Teknik (Konsep, Teori dan Aplikasi)", Penerbit Pustaka Pelajar, Yogyakarta.<br>7. Bimal K. Bose, 2019, "Power Electronics in Renewable Energy Systems and Smart Grid", IEEE Press. John Wiley & Sons, Inc., Hoboken, New Jersey<br>**8.** Homer Energy, 2016, "HOMER® Pro Version 3.7 User Manual", 30th St Suite 100 Boulder CO 80301 USA |