

Table S20. Engineering category

Category	Engineering
General	Twelve disciplines are in this subcategory and they are basic subjects on engineering. Many of disciplines are relatively high in OA. Cell tissue engineering is a special group high in OA (60.1% in 2000-2021 and 69.3% in 2021). Other disciplines high in OA are remote sensing, imaging science photographic technology, quantum science technology, and instrument instrumentation. Information of these subjects would be useful to many manufacturing industries regardless of their items produced. A total of 579,970 articles are available for OA, which covers 33.4% (Suppl. table 16)
Architecture, urban planning, construction	Six disciplines are relatively low in OA but are increasing in 2021 OA trends are not different by disciplines in this subcategory and ranged 17-28% in 2000-2021 and 34-39% in 2021. A total of 114, 478 articles or 19.7% of total are available for OA. (Suppl. table 17).
Computer	Computer engineering is another type of intellectual property rights related domain and OA rate is relatively low. A total of 712,959 articles or 18.0% of total are available for OA. (Suppl. table 18)
Major	Sixteen disciplines in this subcategory are major industry-related domains. Average of OA in 2000-2021 was 17.1% and the most recent data in 2021 is 34.3%. The multidisciplinary and marine engineering are relatively high (57.2% and 50.2% in 2021). Chemical and geological engineering are among the lowest group (19.1% and 18.8% in 2021). A total of 1.2 million articles are available for OA but they cover 17.1% of all produced documents in this domain. (Suppl. table 19, Fig. 6, Suppl. fig. 15)
Materials	Ten disciplines in this subcategory is also low in OA. Multidisciplinary material science, biomaterials, mineralogy, paper wood are relatively higher but at the level of 33-45% in 2021 (16-23% in 2000-2021). A total of 632,433 articles or 20.2% of total are available for OA. (Suppl. table 20)
OA trends	Engineering category is highly related to intellectual property rights and OA is not well accepted in this category. The proportion of OA articles are lower than natural sciences and health and medicine. Multidisciplinary research subjects on engineering, however, would be a glue to fill the gap between disciplines.
Library service plans	Information on specific subject domains would be acquired through toll-based subscription by companies and OA would not be very useful to those requirements. Technical information on general engineering domains would be additionally served and twelve disciplines of general engineering would be a common OA resources for those at different engineering disciplines.

General summary of five subcategories and their open access trends and possible plans for library services