

Soil Microbiology Course — Weekly Reading List (Journal Articles)

Curated peer-reviewed journal articles (published within the last 5 years, review papers prioritized) supporting the Weeks 1–8 and 10–13 lecture topics of the Soil Microbiology course. References follow APA (7th edition) format, with direct links.

Week 1: Introduction to Soil Microbiology

1. Banerjee, S., & van der Heijden, M. G. A. (2023). Soil microbiomes and one health. *Nature Reviews Microbiology*, 21(1), 6–20. *[Review]*
Link: <https://doi.org/10.1038/s41579-022-00779-w>
2. Zhu, Y.-G., Zhu, D., Chen, Q.-L., & Rillig, M. C. (2026). Impacts of pollution on the soil microbiome. *Nature Reviews Microbiology*. *[Review]*
Link: <https://doi.org/10.1038/s41579-026-01350-7>
3. Wood, J. L., et al. (2026). Restoring soil and sediment microbiomes in the Anthropocene. *Nature Reviews Microbiology*. *[Review]*
Link: <https://doi.org/10.1038/s41579-026-01307-w>

Week 2: Soil Microbial Diversity

1. Philippot, L., Chenu, C., Kappler, A., Rillig, M. C., & Fierer, N. (2024). The interplay between microbial communities and soil properties. *Nature Reviews Microbiology*, 22(4), 226–239. *[Review]*
Link: <https://doi.org/10.1038/s41579-023-00980-5>
2. Ma, B., Lu, C., Wang, Y., Yu, J., Zhao, K., Xue, R., Ren, H., Lv, X., Pan, R., Zhang, J., Zhu, Y., & Xu, J. (2023). A genomic catalogue of soil microbiomes boosts mining of biodiversity and genetic resources. *Nature Communications*, 14, 7318. *[Research paper]*
Link: <https://doi.org/10.1038/s41467-023-43000-z>
3. Labouyrie, M., Ballabio, C., Romero, F., Panagos, P., Jones, A., Schmid, M. W., Mikryukov, V., Dulya, O., Tedersoo, L., Bahram, M., Lugato, E., van der Heijden, M. G. A., & Orgiazzi, A. (2023). Patterns in soil microbial diversity across Europe. *Nature Communications*, 14, 3311. *[Research paper]*
Link: <https://doi.org/10.1038/s41467-023-37937-4>

Week 3: Microbial Nutrient Cycling

1. Sokol, N. W., Slessarev, E., Marschmann, G. L., Nicolas, A., Blazewicz, S. J., Brodie, E. L., Firestone, M. K., Foley, M. M., Hestrin, R., Hungate, B. A., et al. (2022). Life and death in the soil microbiome: How ecological processes influence biogeochemistry. *Nature Reviews Microbiology*, 20(7), 415–430. *[Review]*
Link: <https://doi.org/10.1038/s41579-022-00695-z>
2. Peñuelas, J., Zheng, B., Tariq, A., & Sardans, J. (2026). Microbial phosphorus cycling in terrestrial ecosystems. *Nature Reviews Microbiology*. *[Review]*
Link: <https://doi.org/10.1038/s41579-026-01296-w>
3. Yan, X., Shan, J., Wang, X., Wang, B., Liu, S. J., et al. (2025). Uncovering the soil nitrogen cycle from microbial pathways to global sustainability. *Nitrogen Cycling*, 1, e002. *[Review]*

Link: <https://doi.org/10.48130/nc-0025-0005>

Week 4: Microbial Weathering in Extreme Environments

1. Wild, B., Gerrits, R., & Bonneville, S. (2022). The contribution of living organisms to rock weathering in the critical zone. *npj Materials Degradation*, 6, 98. *[Review]*

Link: <https://doi.org/10.1038/s41529-022-00312-7>

2. Hadland, N., Hamilton, C. W., & Duhamel, S. (2024). Young volcanic terrains are windows into early microbial colonization. *Communications Earth & Environment*, 5, 1–19. *[Review]*

Link: <https://doi.org/10.1038/s43247-024-01280-3>

3. Hadland, N., Hamilton, C. W., Björnsdóttir, S., & Duhamel, S. (2025). Three eruptions at the Fagradalsfjall Volcano in Iceland show rapid and predictable microbial community establishment. *Communications Biology*, 8, 1712. *[Research paper]*

Link: <https://doi.org/10.1038/s42003-025-09044-1>

Week 5: Carbon Sequestration and CO₂ Biomineralization

1. Omoregie, A. I., Muda, K., Ojuri, O. O., Hong, C., Pauzi, F., & Ali, N. (2022). The global research trend on microbially induced carbonate precipitation during 2001–2021: A bibliometric review. *Environmental Science and Pollution Research*, 29(60), 89899–89922. *[Review]*

Link: <https://doi.org/10.1007/s11356-022-24046-w>

2. Schinteie, R., Nagaraj, V., Stalker, L., Tran-Dinh, N., & Midgley, D. J. (2025). Beyond carbonate biomineralization: Why prokaryote-driven CO₂ sequestration demands holistic evaluation. *Frontiers in Bioengineering and Biotechnology*, 13, 1690042. *[Review]*

Link: <https://doi.org/10.3389/fbioe.2025.1690042>

3. Dranseike, D., Cui, Y., Ling, A. S., Donat, F., Bernhard, S., Bernero, M., Areeckal, A., Lazic, M., Qin, X.-H., Oakey, J. S., Dillenburg, B., Studart, A. R., & Tibbitt, M. W. (2025). Dual carbon sequestration with photosynthetic living materials. *Nature Communications*, 16, 3832. *[Research paper]*

Link: <https://doi.org/10.1038/s41467-025-58761-y>

Week 6: Carbon-Negative Biotechnology

1. Liang, X., Duan, Y., Su, Y., Chen, J., Zhang, M., Ye, X., & Fu, W. (2025). Carbon capture by biological methods. *Cambridge Prisms: Carbon Technologies*, 1, e4. *[Review]*

Link: <https://doi.org/10.1017/cat.2025.10005>

2. Wong, P. Y., et al. (2024). Advances in microbial self-healing concrete: A critical review of mechanisms, developments, and future directions. *Science of the Total Environment*, 947, 174553. *[Review]*

Link: <https://doi.org/10.1016/j.scitotenv.2024.174553>

3. Omoregie, A. I., Ouahbi, T., Ong, D. E. L., Basri, H. F., Wong, L. S., & Bamgbade, J. A. (2024). Perspective of hydrodynamics in microbial-induced carbonate precipitation: A bibliometric analysis and review of research evolution. *Hydrology*, 11(5), 61. *[Review]*

Link: <https://doi.org/10.3390/hydrology11050061>

Week 7: Soil and Groundwater Bioremediation

1. Muter, O. (2023). Current trends in bioaugmentation tools for bioremediation: A critical review of advances and

knowledge gaps. *Microorganisms*, 11(3), 710. [Review]

Link: <https://doi.org/10.3390/microorganisms11030710>

2. Ruan, Z. P., et al. (2024). Engineering natural microbiomes toward enhanced bioremediation by microbiome modeling. *Nature Communications*, 15, 4694. [Research paper]

Link: <https://doi.org/10.1038/s41467-024-49098-z>

3. Marquiegui-Alvaro, A., Kottara, A., Chacón, M., Cliffe, L., Brockhurst, M., & Dixon, N. (2025). Genetic bioaugmentation-mediated bioremediation of terephthalate in soil microcosms using an engineered environmental plasmid. *Microbial Biotechnology*, 18(1), e70071. [Research paper]

Link: <https://doi.org/10.1111/1751-7915.70071>

Week 8: Environmental Geotechnology

1. Sun, Y., Wang, H., Long, X., Xi, H., Biao, P., & Yang, W. (2022). Advance in remediated of heavy metals by soil microbial fuel cells: Mechanism and application. *Frontiers in Microbiology*, 13, 997732. [Review]

Link: <https://doi.org/10.3389/fmicb.2022.997732>

2. Chakma, R., Hossain, M. K., Paramasivam, P., Bousbih, R., Amami, M., Toki, G. F. I., Haldhar, R., & Karmaker, A. K. (2025). Recent applications, challenges, and future prospects of microbial fuel cells: A review. *Global Challenges*, 9(5), 2500004. [Review]

Link: <https://doi.org/10.1002/gch2.202500004>

3. Kirmizakis, P., et al. (2025). Microbial fuel cells to monitor natural attenuation around groundwater plumes. *Environmental Science and Pollution Research*, 32, 1–15. [Research paper]

Link: <https://doi.org/10.1007/s11356-024-35848-5>

Week 10: Soil Microbiome Sequencing Technologies

1. Zhang, T., Jiang, M., Li, H., Gao, Y., Yousuf, S., Yu, K., Yi, X., Wang, J., Yang, L., & Liu, Y.-X. (2025). Computational tools and resources for long-read metagenomic sequencing using Nanopore and PacBio. *Genomics, Proteomics & Bioinformatics*, 23(4), qzaf075. [Review]

Link: <https://doi.org/10.1093/gpbjnl/qzaf075>

2. Burian, J., Boer, R. E., Hernandez, Y., Morales-Amador, A., Jiang, L., Bhattacharjee, A., Panfil, C., Ternei, M. A., & Brady, S. F. (2025). Bioactive molecules unearthed by terabase-scale long-read sequencing of a soil metagenome. *Nature Biotechnology*. [Research paper]

Link: <https://doi.org/10.1038/s41587-025-02810-w>

3. Agostinho, D. P., Fu, Y., Menon, V. K., et al. (2024). Unveiling microbial diversity: Harnessing long-read sequencing technology. *Nature Methods*, 21(6), 954–966. [Review]

Link: <https://doi.org/10.1038/s41592-024-02262-1>

Week 11: Bioinformatics and Functional Prediction

1. Lu, Y., Zhou, G., Ewald, J., Pang, Z., Shiri, T., & Xia, J. (2023). MicrobiomeAnalyst 2.0: Comprehensive statistical, functional and integrative analysis of microbiome data. *Nucleic Acids Research*, 51(W1), W310–W318. [Research paper (tool)]

Link: <https://doi.org/10.1093/nar/gkad407>

2. Srivastava, A., Akhter, Y., & Verma, D. (2024). A step-by-step procedure for analysing the 16S rRNA-based microbiome diversity using QIIME 2 and comprehensive PICRUSt2 illustration for functional prediction.

Archives of Microbiology, 206(12), 467. *[Review]*

Link: <https://doi.org/10.1007/s00203-024-04177-z>

3. Wishart, D. S. (2026). Bioinformatic tools for microbiome analysis: From raw sequences to biological insights. *Frontiers in Microbiology*, 17, 1913362. *[Review]*

Link: <https://doi.org/10.3389/fmicb.2026.1913362>

Week 12: Artificial Intelligence in Soil Microbiology

1. Hernández Medina, R., Kutuzova, S., Nielsen, K. N., Johansen, J., Hansen, L. H., Nielsen, M., & Rasmussen, S. (2022). Machine learning and deep learning applications in microbiome research. *ISME Communications*, 2, 98. *[Review]*

Link: <https://doi.org/10.1038/s43705-022-00182-9>

2. Pace, R., Monti, M. M., Cuomo, S., Affinito, A., & Ruocco, M. (2026). Machine learning approaches to assess soil microbiome dynamics and bio-sustainability. *Physiologia Plantarum*. *[Research paper]*

Link: <https://doi.org/10.1111/ppl.70719>

3. Ivanova, E. A., Suleymanov, A. R., Nikitin, D. A., Semenov, M. V., & Abakumov, E. V. (2025). Machine learning-based mapping of Acidobacteriota and Planctomycetota using 16S rRNA gene metabarcoding data across soils in Russia. *Scientific Reports*, 15, 1–14. *[Research paper]*

Link: <https://doi.org/10.1038/s41598-025-08050-x>

Week 13: Imaging Medicine and Precision Microbiology

1. Ratiner, K., Ciocan, D., Abdeen, S. K., & Elinav, E. (2024). Utilization of the microbiome in personalized medicine. *Nature Reviews Microbiology*, 22(5), 291–308. *[Review]*

Link: <https://doi.org/10.1038/s41579-023-00998-9>

2. Turrone, S. (2025). Is precision microbiome medicine just around the corner? *Nature Reviews Gastroenterology & Hepatology*. *[Review]*

Link: <https://doi.org/10.1038/s41575-025-01040-4>

3. Dakal, T. C., Xu, C., & Kumar, A. (2024). Advanced computational tools, artificial intelligence and machine-learning approaches in gut microbiota and biomarker identification. *Frontiers in Medical Technology*, 6, 1434799. *[Review]*

Link: <https://doi.org/10.3389/fmedt.2024.1434799>