ES7020 Introduction to Geophysics (3AUs)

The aim of this course is to introduce the fundamental concepts of the solid Earth, providing students with a theoretical foundation and exercises that incorporate basic computational methods to quantitatively explore subsurface Earth structures. Building on this background, the course will then focus on near-surface geophysical imaging, covering a range of techniques including active and passive source seismology, gravity, magnetic, geoelectric, and electromagnetic surveys. Students will learn the physical principles behind these techniques, practice how they are applied, and review and interpret results through a mixture of lectures, computational exercises, and practical examples. Whenever possible, field-based data collection within Singapore will be included to offer direct, hands-on experience; where this is not feasible, real-world datasets will be used for classroom exercises and labs. Throughout the course, students will develop an understanding of the complementary perspectives each method offers and how, when combined, they provide a coherent view of the subsurface, with an emphasis on precision, interpretation, and the distinction between results and their implications.

The course introduces the fundamental concepts of the solid Earth, providing students with a theoretical foundation and exercises that incorporate basic computational methods to quantitatively explore subsurface Earth structures. With this background, the course transitions to an introduction to near-surface geophysical imaging, presenting a range of techniques including seismology, gravity, magnetic, and electrical surveys. As an introductory course in geophysics, it familiarizes students with the fundamental principles and applications of each method that offer complementary perspectives and, when used together, provide a coherent view of the subsurface. Whenever possible, the course will include field-based data collection within Singapore, offering direct, hands-on experience. When fieldwork is not feasible, real-world datasets will be used for classroom exercises and labs. Students will be exposed to realistic examples and approaches aligned with current research and industrial practice.