

The Division of Earth Sciences (DES) at Nanyang Technological University (NTU, Singapore) is the academic arm of the Earth Observatory of Singapore (EOS), which is a research institute at the university. DES was established in 2010, and shares many of the same faculty and goals as EOS. The Division and the Observatory are working in partnership to develop academic capacity in such areas as the sustainable use of energy and water resources, the identification of and adaptation to natural hazards and changing climate, and the environmental consequences of human activities. DES's graduate program has been in place since AY2010/11, and we just submitted a proposal to the university for the launch of an academic major and minor in AY2013/14. Our vision is to become a leader in 21st-century Earth and environmental science, by building a better understanding of Earth and its processes, and enabling activities that ensure adequate energy and water resources and a safer and more sustainable presence of humanity on Earth.

In order to achieve these lofty goals, we have developed a multidisciplinary degree program that examines the interactions between the solid Earth, atmosphere, hydrosphere, and biosphere, with an emphasis on how the physical, biological, and chemical processes at Earth's surface affect each other. The core of the curriculum includes courses from Earth sciences, mathematics, physics, chemistry, and biology. In addition to this core curriculum, students in the Earth systems and society specialization will conduct additional coursework in Earth science, sociology, and economics chosen to offer a unique understanding of the complex interactions between humans and the natural world, while students who choose the geosciences specialization will conduct additional coursework in advanced geoscience. Students from all specializations will have the opportunity to take additional elective courses in Earth science and other subjects, and students can also use electives to conduct a final year project or complete an industrial attachment.

Our program is new, and so it is difficult to be sure of the career paths students will choose, although we have identified likely career goals for our students, and are currently in the process of establishing communication with possible employers. Graduates should be prepared to fill a variety of positions after graduation, or to pursue additional specialized training programs. We expect students to have job opportunities in Singapore, but also the opportunity to pursue jobs in Southeast Asia or overseas. If they choose, graduates can pursue employment locating and extracting natural resources such as oil, gas, water, and minerals. In the construction industry, Earth and environmental scientists will have fundamental knowledge that is necessary in planning, designing, and executing projects, and managing the environmental consequences of these projects. Graduates with and Earth systems and society specialisation will be uniquely prepared to work in public and private sector planning for the future demands of a growing and modernizing Singapore.

Our program possesses several main strengths. First, DES and EOS have drawn a talented and capable faculty from around the world. They are developing exciting research programs, and are excited to pass their knowledge on to the next generation of Earth and environmental scientists in Singapore and the region. Another strength is that because we are starting a brand new undergraduate program, we have had the opportunity to design a program from the ground up in a way that reflects our goals for our students. Finally, undergraduate programs at NTU are much more structured than programs in the United States typically are. When students apply to university, they apply directly to their chosen major program, and rarely change course once they have been accepted. Although students do have some required coursework outside of their major, a bulk of their coursework during their four-year program is structured within the major. As we have developed our program we have come to see this structure as a potential strength for our program, in that we can plan students' progression in skills and content knowledge through the major.

As a new program, we do face significant challenges. A main challenge will be recruiting students for our major. Until we arrived, Earth Science was not a university subject in Singapore, and it is also not part of the pre-university curriculum. Geography is a more established discipline here, but because it is situated in the humanities, the students who are most likely to be interested in physical geography are likely to not have the quantitative skills necessary to enter our program. Because of this, we see recruitment of majors as one of our main goals and challenges as we move towards the launch of our major. Another challenge is building the faculty to support our major. We have an aggressive hiring plan for the next several years, but it still will be a challenge to build our faculty to support the teaching that is required given the major requirements we have established. This is compounded by the fact that NTU expects majors to be fairly large (our current expected steady-state would be 400 total majors), and thus we will have to plan for multiple sessions of laboratories or tutorials for most of our classes. Other challenges in terms of staffing are the strong research commitments of the faculty, their broad range of teaching experience, and that many of the courses will have to be newly developed. We expect that lecturers, laboratory managers, and undergraduate coordinators can help to mitigate some of these issues, but it may be difficult to recruit appropriate manpower given that Earth science is not a field that has historically been taught in Singapore. Finally, although we have identified likely career paths for our students, our goal is to educate employers about the strengths our students possess as graduates and make strong connections with employers to make sure our students are well-placed after graduation.