

### **3.4.3.12 Minor in Pharmaceutical Science**

Host Department: Pharmacy

The pharmaceutical industry in Singapore has expanded tremendously in the past two decades, as more pharmaceutical and biopharmaceutical companies set up new manufacturing and research facilities here. Physical expansion draws in manpower with relevant knowledge and skills to the industry. In addition to the requisite domain knowledge which may be science, engineering, law or business; these organizations are also seeking to hire graduates with supplementary knowledge relevant to the pharmaceutical industry. This adjunct knowledge is based on a foundation in pharmaceutical sciences. Having an understanding of pharmaceutical sciences will enable these graduates to quickly immerse themselves in the environment of the industry, and may ease the initial learning curve and towards greater proficiency in practice.

The Minor in Pharmaceutical Sciences therefore serves to enrich the education of undergraduates in the following ways:

1. To build a fundamental technical language, knowledge and skill set relevant to the pharmaceutical industry.
2. To help raise awareness among undergraduates from different majors of the potential applications of their domain knowledge in the pharmaceutical industry.

There are many career opportunities in the pharmaceutical and allied industries for graduates who have a background in pharmaceutical sciences. Graduates who major in biology, chemistry, mathematics, statistics, food science, materials science, computing and engineering are needed to fill positions in research laboratories, manufacturing plants, quality assurance laboratory of pharmaceutical companies. In addition, those with degrees in law, economics, marketing or business may also develop rewarding careers as finance, human resource, intellectual property and legal, as well as business and market development professionals in the industry. It definitely takes multi-disciplinary teams with a variety of skills to develop and produce effective and safe health products.

#### **Prerequisites**

- H2 pass or equivalent in Biology or Chemistry
- Diploma from local polytechnics (Biology-related or Chemistry-related modules) or
- NUS High School Diploma (Biology or Chemistry) or
- IB Diploma (Biology or Chemistry) or
- A bridging module in either Biology or Chemistry taken at the NUS.

#### **Curriculum Structure and Requirements**

Candidates accepted into the minor programme are required to pass two (2) essential modules and four (4) elective modules, of which at least one (1) must be a Level 3000 or 4000 module. Some modules have practical component that will allow students to acquire relevant basic

laboratory skills.

Essential modules:

- PHS1110 Foundations for Medicinal and Synthetic Chemistry
- Either PR2114 Formulations and Technology I or PHS1114 Principles of Pharmaceutical Formulations I

Choose FOUR from the following elective modules:

- PR1301 Complementary Medicine and Health
- PHS2115 Basic Principles of Drug Design and Development
- PHS2117 Principles of Pharmaceutical Formulations II
- PHS2143 Analytical Techniques and Pharmaceutical Applications
- PR2202 Cosmetics and Perfumes
- PR3204 Medicinal Natural Products
- PR4205 Bioorganic Principles of Medicinal Chemistry
- PR4206 Industrial Pharmacy
- CN4241R Engineering Principles for Drug Delivery
- SP4263 Forensic Toxicology and Poisons

The target applicants for this minor programme are students who are pursuing science or engineering-based majors. In addition, students who major in law, economics, computing, marketing or business may also apply, provided the pre-requisites are met.

This minor is not awarded to those with a primary major in Pharmacy or Pharmaceutical Science.