

**Department of Biotechnology**  
**Introduction to South Asia**  
**B-1: *Science and Society***

**Duration:** Fridays, 11 am – 1 pm; 24 April – 04 May 2017

**Credits: 1**

**Course Instructors:** As indicated

**Note:** The course is limited to a maximum of 25 students on a first-come-first-served basis. The course will not be offered if a minimum of ten students have not opted for it.

**Course Objectives:**

**1. Science: The South Asian Ethos (Prof Rajiv K Saxena)**

This unit will trace the history of scientific discoveries and the development of technologies in the region and compare it with parallel developments in the world. South Asian thought is intimately linked with the spiritual ethos of the region and has had a profound influence on the way the people and thinkers of the region view science. This cross-talk between the spirituality and the scientific temper will be the focus.

**2. The Origin of Humans in South Asia (Dr Nirotpal Mrinal)**

This unit will focus on who is South Asian and how this area was populated during the course of human evolution as well as how human migration has contributed to the development of the South Asian population.

**3. Mental Health in South Asia (Dr Ravi Akundi)**

The increasing number of deaths and decrease in disability adjusted life years due to neglected mental health is a major issue in South Asia. The Global Health Education Consortium (2009) study revealed that neurological disorders comprise 6.3% of the global burden of disease - more than that due to HIV, tuberculosis or ischemic heart disease. South Asia has a higher average suicide rate as compared to the global average. The attempt will be to make students realize the burden of these diseases and briefly discuss the measures (current and proposed) required to control/manage mental health disorders.

**4. Nutritional Deficiencies in South Asia (Dr Dhruv Sethi)**

Malnutrition, obesity, vitamin deficiency, iron deficiency, calcium deficiency and iodine deficiency are rampant in South Asia. Common diseases that might occur because of these deficiencies and steps to ameliorate these deficiencies need to be understood and worked upon.

## **5. The Burden of Infectious Diseases in South Asia (Dr Ritu Gaur)**

Infectious diseases are a major cause of death in South Asia. Over two thirds of the estimated 3.7 million deaths in children in South Asia were attributable to infections such as pneumonia, diarrhoea, and measles. India now has the second largest population with AIDS and HIV infection in the world, and tuberculosis and chronic hepatitis continue to threaten the lives of millions. Serious efforts need to be made to control infectious disease if South Asian countries are to meet their millennium development goal of two thirds reduction in child mortality. Discussions will centre around the underlying causes of some of the more common diseases and strategies to improve their detection and control.

## **6. South Asia and Microbial Diseases (Dr Priti Saxena)**

The focus will be on the bacterial diseases that are endemic in the South Asian region. The confluence of various factors like geography, climate, population, socio-economic variability, ill functioning public health structures, lack of disease awareness and hygiene play a big part in the augmentation and spread of some of the deadly infections like pneumonia, tuberculosis, leprosy, cholera, typhoid and plague. Modes of disease acquisition, virulence, host-pathogen interactions, disease control, antibiotics, pathogen colonization and drug resistance, and the importance of medical regimes in disease eradication will be discussed.

## **7. Cancer – Burden in South Asia (Dr Yubraj Pokharel)**

In the SAARC region 5,87,200 males and 711,700 females suffer from cancer. The most frequent cancers in males are lung, lip and oral cavity, pharynx, esophagus and stomach cancers while breast, cervix, uteri, ovary lip and oral cavity and esophagus cancers are common amongst women. India, Pakistan, Sri Lanka, Nepal, Bangladesh have national cancer control programmes whereas Bhutan, Afghanistan and Maldives don't have any organized cancer control programmes. A collective effort needs to be initiated in this region for cancer control and cancer registry.

## **8. Non-infectious Diseases in South Asia (Dr Senthil Venugopal)**

Increasing economic prosperity and changes in lifestyle have resulted in changes in diet among the urban class in the South Asian region. Due to this, several non-infectious diseases such as heart disease, diabetes and liver related problems have increased tremendously in recent years. This results in the development of obesity and metabolic syndrome, which greatly affects human health.

## **9. Biotechnology in crop improvement in South Asia (Dr Anand Mustafiz)**

Agriculture and food production in South Asia and the various abiotic stresses that affect the yield of the crops will be the focus here. Modern biotechnology procedures involved in plant breeding or molecular breeding, marker assisted selection and

genetic engineering are all important issues. Urban myths and real concern about genetically modified crops will also be discussed.

#### **10. Role of Biofuels in Solving the Energy Crisis in South Asia (Dr Rinkoo Gupta)**

The various aspects of the energy crisis in South Asia such as fossil fuel depletion, increasing demand and hike in oil-prices as well as fossil-fuel exploitation and related environmental issues will be addressed. Alternative energy sources, including bioenergy, nuclear energy, wind and solar energy need to be considered. Biotechnology and related techniques can assist South Asia to attain energy-independence from fossil-fuel utilization.

#### **11. Environmental and Climate Issues in South Asia (Dr A K R Gobinath)**

The South Asian region has certain common environmental problems like land dilapidation, water scarcity, deforestation, loss of biodiversity, atmospheric pollution and natural hazards, largely due to higher population, industrialization and over exploitation of natural resources. This class will focus on the current status of these environmental issues in South Asia and their remedial mechanisms.

#### **12. Contribution of South Asian Scientists to Science (Dr Senthil Venugopal)**

The class will highlight the key contributions made by scientists in this region. We will also look at what needs to be done to improve lifestyles, health and agriculture in South Asia.

#### **Evaluation**

1. Assignments/Quiz : 10 marks
2. End-semester written exam with a mix of long and short answers (40 marks)

#### **References:**

1. Nelson, David, et al, *Lehninger's Principles of Biochemistry*, WH Freeman (latest edn.)
2. Slonszewski, Foster, *Microbiology: An Evolving Science* (2nd edn.).
3. Alberts, Bruce, *Molecular Biology of the Cell*.
4. Krebs, Jocelyn, Elliot Goldstein and Stephen Kilpatrick, *Lewin's Genes* (11<sup>th</sup> edn), Jones and Bartlett, 2012.
5. Sambrook and Russell, *Molecular Cloning: A laboratory Manual*.
6. Chaterjee, A K, *Introduction to Environmental Biotechnology*, Prentice-Hall of India.