



Department of Vector Biology & Control

Diploma Course in Vector Biology & Control (VBC)



Course Organizer:

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Course Coordinator:

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Introduction

This Diploma course will guide you through the acquisition of a matrix of skills acquired from 11 modules including knowledge of the major vectors and vector-borne diseases in relevance to the region; skills to conduct entomological surveillance; knowledge of the principles of epidemiological investigations of vector-borne diseases; skills in disease control program management; skills to develop vector control strategies based on the principles of IVM; and, skills to facilitate and train others, and effectively document and disseminate information on entomology and vector control.

Why Study VBC at TUMS School of Public Health (SPH)?

- Turn your passion into your dream job with the VBC program
- The University of Tehran Diploma awarded, internationally recognized
- One of the top research-led universities in Iran
- Unique department of Vector Biology & Control in Iran and the EMRO region
- Well-known academics with international teaching, research, and consultancy experience
- A challenging teaching approach: Quality, creativity, and empowerment
- A rich history and contribution of international diploma course on malaria planning and management dating back to 1996

About the VBC Diploma Course at the SPH-TUMS

The School of Public Health (SPH) offers the VBC Diploma Course, and it has managed to maintain a strong and steady flow of partnerships and collaborations with several international organizations, i.e. World Health Organization, Red Crescent, UNICEF, ECO, among others. This school enjoys the presence of pioneer, high-ranking, and internationally renowned faculty members to teach, supervise, and contribute to various subjects in the academic environment and the field. The VBC Diploma Course is designed to provide an incredible opportunity for students to learn up-to-date and fundamental skills in the core areas of vector biology and control, which are carefully tailored to meet the needs of individuals who are working, or planning to work, in the public health sector in the region and across the world. Spending 10 weeks with the SPH to earn the VBC Diploma goes beyond merely earning a Diploma. The program will provide participants with a lifelong and memorable experience through participating in many exciting activities and living the real life of vector biology and control in the field.

Course Description

The VBC Diploma Course at the SPH includes 11 courses and a field internship. This program lasts normally 10 weeks. It will be conducted on a full-time basis starting on 21st October 2023.

This course will be held every year at the same time.

Admission Requirements (Eligibility Criteria)

All applicants for the VBC Diploma Course must have the following criteria:

1. Graduates of Medicine (General practitioner), Veterinary medicine, pharmacy; or
2. Graduates with Bachelor's or Master or equivalent degrees in health-related programs;
3. Fluency in English (having a previous degree from an English-spoken university, or submitting a minimum IELTS score of 5.0 or equivalent TOEFL Score), or passing the English exam of the Language Academy of TUMS International College.
4. Be selected by the Selection Committee,

Also, the following criteria are preferred:

1. Work experience in the field of Public Health
2. Submit Reference Letters from academic members or senior public health officials.

Registration

The applicants should complete the Online Application Form, accompanied by a Letter of Motivation and an updated C.V. by August 1, 2023. Guidelines on how to write your Letter of Motivation and your C.V. can be found at <http://en.tums.ac.ir/en>.

Admission Procedures

This program has a maximum capacity of 20 seats per academic year. TUMS Admissions Committee will select the most competent applicants. The acceptance letters will be sent to successful applicants by TUMS.

Tuition Fees

The tuition fees, and expenses (Student's Insurance, dormitory, food) at TUMS for the VBC Diploma Course are **3500 US\$**.

Contact Information

Should you have any queries, please do not hesitate to contact the Office of International VBC Admissions at:
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The arrangement of the course

Week	Module (s)
1	Arthropods of Medical Importance; Control Methods for Arthropods
2	Malariology; Control Methods for Arthropods
3	Leishmaniasis; Control Methods for Arthropods
4	Arbovirology; Control Methods for Arthropods
5	Geographical Information Systems; Internship
6	Internship
7	Basic Epidemiology & Biostatistics
8	Pesticides and their Uses; Rodents of Medical Importance and their Control Methods
9	Epidemiology of Vector-Borne Diseases; Rodents of Medical Importance and their Control Methods
10	Management of Vector-Borne Diseases

The Curriculum of the VBC Diploma Course

• Arthropods of Medical Importance

Contents:

- General Entomology (Morphological Characters and Taxonomy)
- General medical entomology
- General characteristics of important groups of arthropods, orders of medically important insects
- Diptera of medical importance (Culicidae, Ceratopogonidae, Simuliidae, Psychodidae, Tabanidae, Glossinidae, Muscidae, Sarcophagidae, Oestridae, Calliphoridae)
- Cockroaches, Bugs, Fleas, Human Lice (identification, control)
- Ticks (hard, soft) and mites (identification, control)
- Scorpions, Spiders (identification, control)
- Row beetles, Fire ants, Wasps & Bees (identification, control)

Practical sessions:

- Demonstration of educational slides and different specimens of the Culicidae family
- Demonstration of educational slides on Simuliidae
- Demonstration of educational slides on Psychodidae
- Demonstration of educational slides and different specimens of the Tabanidae family
- Demonstration of educational slides and different specimens of the Muscidae family
- Demonstration of educational slides on Cimicidae
- Demonstration of educational slides on fleas and lice
- Demonstration of cockroaches specimens
- Demonstration of educational slides on ticks and mites
- Demonstration of scorpions
- Demonstration of row beetles, Fire ants, Wasps & Bees

• Control Methods for Arthropods

Contents:

- History and background of vector control
- Principles of vector control
- Biological and genetic control
- Physical control, personal protection, repellents
- Environmental health, resource reduction, waste disposal
- Methods of combating specific groups of vectors (cockroaches, bed bugs, lice, mosquitoes, sand flies, flies, fleas, ticks, and mites)

• Malariology

Contents:

- History and distribution of malaria in the world
- The importance of malaria in the Eastern Mediterranean region and the world
- Taxonomy, morphology, ecology, and biology of *Anopheles*

- The role of *Anopheles* in malaria transmission
- Collection methods for *Anopheles*
- Epidemiology of malaria
- Introduction of types of human *Plasmodium* and their biological stages
- Malaria prevention and treatment methods
- Global status of insecticide resistance in malaria vectors
- Interaction between malaria parasites and vectors
- Principles of control planning and evaluation of malaria control operations

Practical sessions:

- Observation and diagnosis of larval and adult samples of mosquitoes at the genus level
- Observation and diagnosis of larval and adult samples of some malaria vectors
- Demonstration of educational slides on malaria parasites
- Working with the morphological identification key of *Anopheles*
- Dissection of salivary glands, ovary, and determination of abdominal conditions of *Anopheles*
- Teaching how to mount a mosquito specimen (adult/larvae) on a slide

• Leishmaniasis

Contents:

- Introduction of leishmaniasis and its importance in the world with emphasis on the Eastern Mediterranean region
- Different sampling methods for sand flies
- Biology and ecology of sand flies and their role in disease transmission
- Reservoir hosts of leishmaniasis in the old world with emphasis on the Eastern Mediterranean region
- Laboratory methods of diagnosis and study of leishmaniasis
- Epidemiology of leishmaniasis in the eastern Mediterranean region
- Interaction of *Leishmania* parasite and sand fly vector
- The basis of management and control of Leishmaniasis

Practical content:

- Morphology of Phlebotominae sand flies
- Preparation of sand fly microscopically slides
- Morphological identification of Phlebotominae sand flies
- Parasitological detection of *Leishmania* parasites
- Direct parasitological test in an animal model to detect the parasite species

• Arbovirology

Contents:

- Introduction, definition, and general characteristics of arboviruses
- Nomenclature, classification, different families of arboviruses
- Structure of viruses and viral replication
- Laboratory diagnosis of arboviruses
- Pathogenicity of arboviruses
- Factors Determine Arbovirus Emergence
- Introduction of the most important arboviruses of the Eastern Mediterranean region and their evolution

- Biology, and behavior of main vectors of arboviral diseases
- Prevention and vector control of arboviral diseases
- Monitoring and surveillance of vectors

- **Geographical Information Systems**

Contents:

- History and an introduction to the concepts of geographic information systems (GIS)
- An overview of the applications of GIS in public health
- Different sources of data in GIS
- Data types in GIS, raster, vector, point, line, polygon
- Entering data into the ArcGIS environment
- Data management and processing in ArcGIS
- Preparation of various types of maps in ArcGIS
- Working with GPS and taking sample capture points/patient presence in field studies of vector-borne diseases

- **Internship**

Practical content:

Malariology

- Various methods of field samplings of Anophelinae (adult and larvae)
- Preserving samples
- Identification of collected samples
- Dissection of collected samples
- Preparing field reports and interpretations

Leishmaniasis

- Various methods of field samplings of adult sand flies
- Preserving samples
- Identification of collected samples
- Dissection of collected samples
- Field studies on the epidemiology of the leishmaniasis
- Field samplings and identifications of rodents' reservoirs of leishmaniasis
- Dissections and taxidermy of rodents
- Preparing field reports and interpretations

Aedini

- Various methods of field samplings of Aedini (egg, larvae, and adult)
- Preserving samples
- Identification of collected samples
- Preparing field reports and interpretations

Myiasis and medically important flies

- Various methods of field samplings of flies and myiasis agents (adult and larvae)
- Preserving samples
- Identification of collected samples
- Dissection of collected samples
- Preparing field reports and interpretations
- Application of medically important flies (maggot therapy)

Vector Control

- Control methods for Anophelinae
 - o Chemical Control (Indoor Residual Spraying including preparing of instruments, calculations of pesticides, methods of teaching local workers, spraying pumps, and thermal fog)
 - o Biological control agents of larvae (larvivorous fish)
 - o Personal Protection (impregnating of bed nets)
- Control methods for leishmaniasis (methods for control of Phlebotomiae, methods for control of rodents)

Ticks

- Field samplings of ticks
- Preserving samples
- Identification of collected samples
- Preparing field reports and interpretations

Insect rearing (insectaries)

- Insectary of mosquitoes
- Insectary of sand flies
- Insectary of medically important flies

• **Basic Epidemiology & Biostatistics**

Contents:

- Quantitative and qualitative data, table, graph
- Central measures (mean, median, mode)
- Dispersion measures (Range, Variance, Standard deviation, Coefficient of variation)
- Statistical distributions (Binomial, Poisson, Normal)
- Sampling methods (simple random sampling, systematic sampling, stratified sampling, cluster sampling)
- Estimation (Population, sample, parameter, sampling units, point estimate, interval estimate)
- Compare two means (t-test)
- Association of categorical variables (Chi-square test)
- Compare several means (ANOVA)
- Application of the Probit model in bioassay studies
- What is Epidemiology?
- Objectives of Epidemiology
- Epidemiology and prevention
- Modes of transmission
- Clinical and subclinical disease
- Endemic, Epidemic, and Pandemic
- Disease outbreaks
- The Dynamics of Disease Transmission

- The measures of Occurrence
- Types of Studies and Errors
- Association and Causation
- Types of Studies (Descriptive studies; Analytical observational studies- Case control; Analytical observational studies- Cohort; Interventional studies- Randomized Trials)
- Measures of association
- Screening Tests
- Ethical Issues in Epidemiology

- **Pesticides and their uses**

Contents:

- An introduction to pesticides
- History of the evolution of insecticides
- Key definitions
- Classification of pesticides
- Different groups of pesticides
- Mode of action of pesticides
- Mechanisms of insecticide resistance
- Monitoring insecticide resistance
- Management of insecticide resistance
- Symptoms and management of pesticide poisoning
- Safe use of pesticides
- Storing and transporting pesticides

Practical sessions:

- Demonstration of different pesticide formulations
- Demonstration of different pesticide application equipment
- Mosquito larval bioassay
- Mosquito adult bioassay
- Biochemical assays
- Molecular methods in insecticide resistance monitoring

- **Epidemiology of Vector-Borne Diseases**

Contents:

- An introduction to the epidemiology of infectious diseases
- The importance of arthropods in the transmission and spread of diseases
- Transmission cycles and factors important in their epidemiology
- Epidemiological aspects of vector-borne diseases
- Epidemiology of the most important vector-borne diseases (Leishmaniasis, Malaria, Arthropod-borne worms, African *Trypanosomiasis*,.....) in the world with an emphasis on the Middle East region
- Prevention and control of some important vector-borne diseases

- **Rodents of Medical Importance and their Control Methods**

Contents:

- The medical and public health importance of rodents
- The mode of transmission of rodent-borne diseases
- Important diagnostic features and anatomy of the rodent skull
- Classification of rodents
- Methods of rodent collections and taxidermy of rodents
- Bio-ecology of rodents
- Types of rodenticides and their application methods
- Rodent control methods

Practical sessions

- Measurement of important diagnostic features and anatomy of the rodent skull
- Morphological identification of rodents
- Collecting medically important rodents
- Taxidermy of rodents
- Rodent control operation

- **Management of Vector-Borne Diseases**

Contents:

- An overview of the transmission cycle of arthropod-borne diseases
- Basic concepts of surveillance, management, evaluation, and monitoring of arthropod-borne diseases
- Epidemiological evaluation of arthropod-borne diseases
- Integrated vector management
- Management of resistance to pesticides and monitoring of vector control
- Required infrastructure and resources in the management of arthropod-borne diseases
- Social determinant of health in the management of arthropod-borne diseases
- Inter-sectoral cooperation in the management of arthropod-borne diseases
- Management strategies of arthropod-borne diseases and the role of vector control in decision-making