

# **Polysomnography Course**

## **General Information**

Polysomnography course will be held at

**SLEEP AND ALERTNESS CLINIC**  
Med-West Medical centre  
Suite 800 - 790 Bay St, Toronto ON M5G 1N8

### **Conducted by:**

Pintu Bhuiya, MBBS, RPSGT, RST

Nada Huterer, MD (Not licensed in Canada), RPSGT

### **Instructors:**

Dr. Colin M. Shapiro, BSc, MBBCh, PhD, MRCPsych, FRCP(C)

Inna Voloh, MD (Not licensed in Canada), RPSGT

Naheed K. Hossain, MBBS, RPSGT

Dragana Jovanovic, BSc, RPSGT

Yulia Kaushansky, BSc, RPSGT

Sharon Chung, PhD

**CEC Credits: "This CEC Program Application has been submitted for approval by the Canadian Sleep Society" and AAST (American Association of Sleep Technologist).**

(note: Continuing Education Credits -CEC was approved for all the previously conducted program)

**Course Time:** A total of **17 session** course, each session in duration of 2 hours. The sessions are conducted at 10 a.m. on Fridays and 9:00 a.m. on Saturdays (except holidays).

The schedule date/time is subject to change based on other educational activities, seminars, APSS, CSS meetings or holidays.

There are two section of the course. The technical component and PSG scoring. Some candidates may be interested in only one of these components. We are happy to accommodate their interest and will reduce payment accordingly.

## **COURSE OUTLINE**

### **1. An Introduction to Sleep and Sleep Disorders**

**Instructor: Sharon Chung**

#### A. Principals of polysomnography: history and technical advances

This session will review the history of polysomnography, provide a summary of the regulation and function of sleep.

- a. History of polysomnography: an account of the rationale behind the development of the recording montage and a brief description of the history of the development of polysomnography technology.
- b. Regulation of sleep: a description of normal sleep and sleep architecture across the lifespan, an overview of sleep-wake regulation and a summary of the function of sleep.

#### B. Brief overview of common primary sleep/wake disorders.

Overview of the most commonly encountered primary sleep/wake disorders incorporating: insomnia, hypersomnia, narcolepsy, sleep breathing disorders, periodic limb movements in sleep/restless legs syndrome, parasomnia, circadian rhythm disorders.

### **2. Sleep Centre Organization and Standards in Ontario**

**(including pediatric sleep study) Instructor: Dragana Jovanovic**

- a. Role of CPSO, AASM, BRPT, AAST
- b. CPSO Guidelines for the sleep clinics (including workflow) and prerequisites for the position of sleep technologist.

**3. Principles of Polysomnography Recording**  
**Instructor: Yulia Kaushansky**

In this session participants will be explained the following topics

- a. EEG, EOG, EMG, ECG recordings (bioelectrical potentials, principle of non-invasive electrodes)
- b. Signal pathway, use of filters, equipment calibration, impedances (good and bad signal)
- c. Sensors for monitoring breathing and non-invasive measurement of oxygen saturation

**4. Conducting Overnight Sleep Study Instructor: Pintu Bhuiya**

The participants will be explained in detail the role of the technologist and the step by step procedures during overnight sleep study as follows.

- a. admitting patients and orientation
- b. pre-sleep and post-sleep questionnaires
- c. set-up procedure (preparation and the use of 10-20 system)
- d. checking of equipment calibration and physiological calibration
- e. lights off/lights on procedure
- f. sleep log and interventions during the night
- g. summary of the study

**5. Safety Considerations Instructor: Naheed Hossain**

All following topics will be incorporated and explained in this session:

- a. ethical and confidentiality issues
- b. safety and security of the environment
- c. infection control
- d. WHIMS/MSDS

- e. fire safety procedure
- f. medical emergencies

**6. Special Montages: PAP Montage/Dental Appliance/Supplemental Oxygen/Extended EEG**  
**Instructor: Pintu Bhuiya**

Candidates will be demonstrated

- a. about the principles and verities of CPAP/BiPAP/Auto-PAP/VPAP machines and their operation techniques
- b. different interfaces and their properties
- c. CPAP/BiPAP titration protocols
- d. dental appliances (adjustable/non-adjustable), fitting procedures, mechanism of function, titration
- e. the use of supplemental oxygen (protocols), operation of oxygen canister/Jar/concentrator
- f. extended EEG recording (parasomnias/seizure disorders etc)

**7. Sleep Staging Concepts Instructor: Pintu Bhuiya**

A comprehensive introduction of normal sleep architecture will be followed by a presentation of the characteristics of the various sleep stages. The participants will learn how brain (EEG), eye movement (EOG), and mental/sub-mental muscle (EMG) signals are used to define Non-REM and REM sleep. Individual epoch examples will illustrate how these variables, viewed collectively, provide diagnostic information regarding normal and/or abnormal sleep. The new AASM scoring guidelines will be discussed in depth.

**8. Arousals and Artifacts Instructor: Pintu Bhuiya**

Arousals will be defined and illustrated helping in understanding how to identify these disturbances of sleep.

Artifact Recognition: Participants will learn how to recognize various artifacts encountered on the polysomnogram. Examples will be presented familiarizing with the specific characteristics of each type.

## **9. Scoring of Respiratory Events**

**Instructor: Nada Huterer**

Candidates will be explained detection of respiratory events.

Definition and classification of apneas (obstructive, central, mixed) and definition(s) of hypopneas

Previous and current AASM/CPSO standards for scoring of apneas and hypopneas.

Rules for scoring Respiratory Effort Related Arousals (RERAs).

Rules for scoring hypoventilation.

Cheyne-Stokes breathing pattern.

## **10. Interpretation of ECG; NPT**

**Instructor: Nada Huterer**

Optimal placement of electrodes for recording of one lead ECG.

Interpretation of one lead ECG with respect to normal heart rhythm and arrhythmias. Definition of bradycardia and tachycardia in sleep. Recognition of different types of cardiac arrhythmias is rehearsed and severity of arrhythmias is discussed.

Nocturnal Penile Tumescence using the 'Rigiscan'

## **11. A. Interface between sleep studies and clinical practice Instructor: Dr. Colin M. Shapiro,**

### **B. Parasomnias and Nocturnal Seizures Instructor: Nada Huterer**

Classification and characteristics of NREM and REM parasomnias.

Characteristics of nocturnal seizures including associated EEG changes. Examples will be shown and a simple test of proficiency will be conducted.

**12. Sleep Related Movements (SRM) Instructor: Inna Voloh**

SRM include Restless Legs Syndrome (RLS), Periodic Limb Movements in Sleep (PLMS), Sleep Related Bruxism, Sleep Related Rhythmic Movement Disorder (body rocking, head banging head rolling, others), Excessive Fragmentary Myoclonus (EFM), Hypnagogic Foot tremor (HFT) and Alternating Leg Muscle Activation (ALMA). Participants will learn definitions and scoring rules for all aforementioned conditions.

**13. Daytime Tests: Multiple Sleep Latency test (MSLT) & Maintenance of Wakefulness Test (MWT) Instructor: Yulia Kaushansky**

Measuring of Excessive daytime sleepiness (EDS); History of development of the MSLT and MWT; Clinical and Research protocols; AASM recommendation for MSLT and MWT protocols; Actual scoring of MSLT and MWT (examples of PSG recording, calculations of sleep onset, session termination time and results); Discussion on factors that can affect MSLT and MWT results (i.e. sleep deprivation, medications, etc).

**Actigraphy Instructor: Sharon Chung**

Actigraph principals, indications for use and interpretation of data

**14. Dim Light Melatonin Onset (DLMO); Driving simulator; Scoring of REM density Instructor: Naheed Hossain**

Melatonin as a biological marker of circadian rhythm is discussed. The relevance of melatonin assessment in the sleep clinic is elucidated. The procedure for DLMO in full is reviewed.

Driving Simulator: Driving simulator as a tool for measurement of alertness is discussed and demonstrated with other performance devices.

Scoring of REM density: Significance of REM sleep and REM density in depressed patients is discussed

## **15. Specifics of Pediatric Scoring Instructor: Dragana Jovanovic**

Characteristics of sleep pattern in children: general considerations; Specifics of sleep architecture from infancy through adolescence; Developmental changes in sleep-wake patterns in children and adolescence; Review of scoring rules and normative values.

## **16. Hands on Scoring of PSG Record Supervised by Instructors: Pintu Bhuiya, Nada Huterer and Inna Voloh**

This is practical session during which each participant is given a task to score a real raw PSG data. This is considered to be a continuation of a learning process and application of a theoretical knowledge the candidates gained during the course.

Candidates are asked to:

- Recognize the technical quality of signals
- Recognize sleep stages
- Recognize arousals, respiratory events and movements in sleep
- Interpret ECG trace, normal or abnormal rhythms
- Recognize possible parasomnia events
- Recognize EEG abnormalities if present

During this session instructors: Nada Huterer, Pintu Bhuiya and Inna Voloh will be available to assist candidates in use of PSG software, and analysis and marking data.

## **17. Review of the Scored Data with Instructors: Pintu Bhuiya, Nada Huterer and Inna Voloh**

The same instructors will review with candidates all records scored, epoch by epoch, and discuss the accuracy of scoring. Correct and incorrect scoring will be clarified and explained.