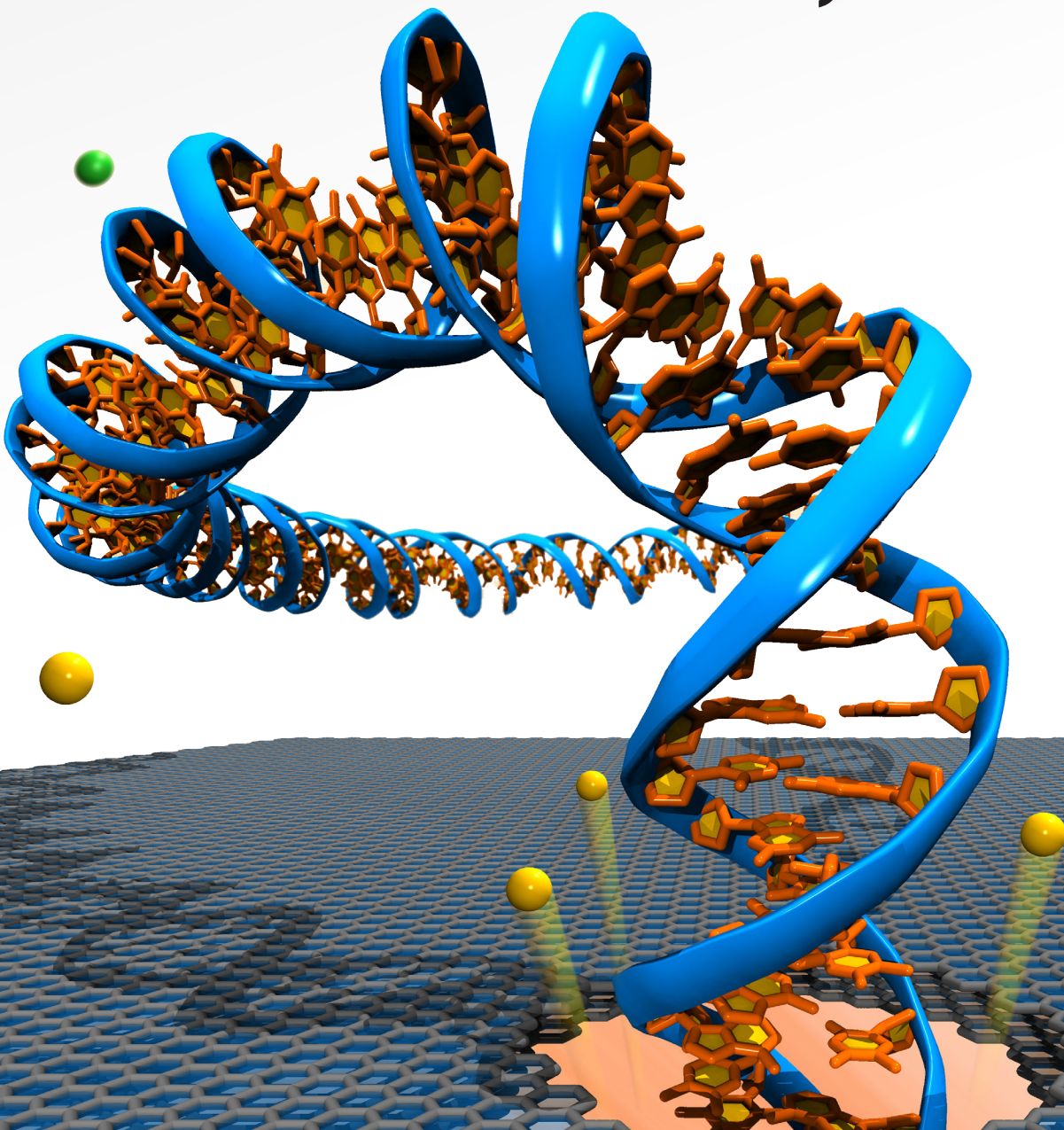




Annual  
**CONFERENCE**

NEW GENOMICS COURSE FOR PATHOLOGY TRAINEES

**Jan 6 - 10, 2014**



# NEW GENOMICS COURSE FOR PATHOLOGY RESIDENTS

JAN 6-10, 2014

We have developed a highly integrative, practical and focused approach to genomics teaching for residents and trainees in the Department of Pathology and Laboratory Medicine to be offered as a 1 week intensive program in Jan 2014. Simple genetic tests with a limited detection threshold are gradually being replaced by multiplex, deeply interrogative assays which coincide with the recent revolutions in massively parallel sequencing and advanced molecular profiling technology. This is further propelled by simultaneous ongoing discoveries of novel cancer pathway aberrations that drive the development and clinical application of novel targeted therapeutics. More questions are being asked of the pathologist and biopsied tissues are getting smaller. This course provides the residents a review and refresher of relevant topics in genomics and epigenomics followed by a survey of available clinically significant molecular diagnostic assays as well as bioinformatic tools.

Genomic medicine and lab medicine, especially pathology, are natural and symbiotic partners in the future of patient care. In many cases, molecular diagnostic assays complement rather than supplement “glass-based” pathology. For example, correct identification of tumor cells and estimation of tumor fraction facilitates downstream analysis. In an era of personalized medicine, understanding of the genomic and epigenomic makeup of a disease lesion, via the appropriate application of advanced molecular tests and bioinformatic analytic tools, represents a logical progression from special stains to epitope-specific antibodies to genetic tests, for making an accurate and informative diagnosis. We will draw from the community of local experts at UBC, the Michael Smith Genome Sciences Centre, the Centre for Disease Control and the BC Cancer Agency in the fields of molecular pathology, molecular biology, microbiology, bioinformatics and genomics to offer an immersive introductory program on current state of the art and emergent technologies and their applications.



Sohrab Shah



Stephen Yip

The core competencies students will obtain and the course outline are listed below:

## Core competencies:

- Solid understanding of the concepts of human molecular biology including the human genome, resources to navigate it, the nature and extent of human genetic variation as it applied to pathology and genetic disorders
- Available and emerging molecular assays for diagnosis
  - understanding the nature of the test, its limitations and assumptions for interpretation
  - appreciate that specific molecular variants can lead to unique histopathology, biochemical findings, and biological behaviour with direct impact on clinical management of patients
  - understand that careful evaluation of the tissue (for extraction of genetic material) and proper pathologic diagnosis are necessary prerequisites for molecular assays
- Understand qualitative differences between human genomes and prokaryotic genomes and highlight the role of genomics in the field of microbiology and infectious diseases
- Understanding the role of computation and bioinformatics in emergent assays

## Syllabus, lead instructors: Dr. Stephen Yip and Dr. Sohrab Shah

*Day 1: Concepts in molecular biology*

*Day 2: Diagnostic tests in 'omics'*

*Day 3: Whole genome/transcriptome approaches + systems biology*

*Day 4: Pathogen genomics*

*Day 5: Future trends near and long term*

## UBC Pathology Genomics/Bioinformatics Core 2013 – TOR



- Provide clinical trainees and graduate students in the Department of Pathology & Laboratory Medicine with an inclusive yet focused and practical course on molecular diagnostic assays relevant to anatomical pathology, hematopathology, medical biochemistry, medical microbiology, and neuropathology.
- Acknowledge that this is a rapidly- evolving field with constantly changing technology as well as expectations and demands from the end-users. The course will include the most up-to-date topics and will also briefly touch on issues such as ethical/medico-legal concerns (including DTC genomics such as 23andMe). However, given the limited time frame of the course these topics may be discussed in detail in subsequent lectures (or PAL series).
- The course will review basic concepts of molecular genetics and how aberrations in the genome/ epigenome can lead to phenotypic changes from congenital malformations to cancers, liquid and solid. This is followed by survey of the available molecular diagnostic assays used to identify these changes and review of tests “on the horizon”.
- The course will devote significant amount of time and resources into survey of open source bioinformatic tools and resources and how they can be utilized in laboratory medicine – in clinical practice or as part of research project.
- Survey of relevant topics on pathogen genomics (eg. rapid identification of pathogens in an outbreak), microbiome (?), and liquid- based diagnostics (biochemistry) will be included.
- There will be a discussion on “careers” in molecular diagnostics with active participation by current fellows (Hector Chang and Tomo).
- Highlight the local expertise and resources in advanced translational genomics to trainees and clinical staff to foster collaborations.
- Guest speaker should be experienced in advanced molecular diagnostics and highlight his/her contribution(s) to the field. Also, there should be interactions with the trainees to facilitate career development.

## A Glimpse of Some of Our Outstanding 2014 Speaker Line-up:

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**Michael S. Anglesio, PhD**

Research Associate, Department of Pathology and Laboratory Medicine  
BC Cancer Research Centre, Cancer

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**Michael M. Burgess, PhD**

Chair in Biomedical Ethics at the W. Maurice Young Centre for Applied Ethics and the  
Department of Medical Genetics at the University of British Columbia  
[mburgess@ethics.ubc.ca](mailto:mburgess@ethics.ubc.ca)

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**Bruce Carleton, B.Pharm, Pharm.D.**

Senior Clinician Scientist, CFRI  
Professor, Department of Pediatrics, University of British Columbia  
Director, Pharmaceutical Outcomes Programme, BC Children's Hospital  
[bcarleton@popi.ubc.ca](mailto:bcarleton@popi.ubc.ca)

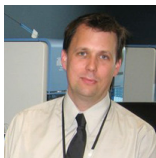
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**Hector Chang**

- To get it from Drs. Yip/Shah

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**Martin Hirst, PhD**

Head of Epigenomics, Michael Smith Genome Sciences Centre, BC Cancer Agency  
Assistant Professor, Dept. of Microbiology and Immunology, Centre for  
High-Throughput Biology, University of British Columbia  
[hirst@chibi.ubc.ca](mailto:hirst@chibi.ubc.ca)

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**Anthony John Lafrate, MD**

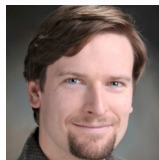
Associate Professor in Pathology  
Harvard Medical School  
[aiafrate@partners.org](mailto:aiafrate@partners.org)



**Janessa Laskin, MD**

Medical Oncologist  
BC Cancer Agency  
[jlaskin@bccancer.bc.ca](mailto:jlaskin@bccancer.bc.ca)

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**Ryan D. Morin, MSc, PhD**

Assistant Professor, Simon Fraser University  
Affiliations: Department of Molecular Biology and Biochemistry and School of Computing  
Science (Associate Member), Simon Fraser University  
Scientist, Genome Sciences Centre, BC Cancer Agency  
[rdmorin@sfu.ca](mailto:rdmorin@sfu.ca)

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**Torsten Nielsen, PhD, MD**

Professor, Departments of Pathology, University of British Columbia  
Associate Professor, Orthopaedics and the Department of Urologic Sciences,  
University of British Columbia  
[torsten@mail.ubc.ca](mailto:torsten@mail.ubc.ca)

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**Kasmintan (Intan) A. Schrader, MBBS**

UBC Medical Genetics & BCCA

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**Sohrab Shah, MSc, PhD (UBC)**

Scientist, Department of Molecular Oncology, BC Cancer Agency; and Assistant  
Professor, Department of Pathology, UBC  
[sshah@bccrc.ca](mailto:sshah@bccrc.ca)

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**Stephen Yip, MD, PhD, FRCPC**

Assistant Professor, Department of Pathology and Laboratory Medicine  
Clinician-Scientist and Consultant Neuropathologist, BC Cancer Agency  
[syip@bccancer.bc.ca](mailto:syip@bccancer.bc.ca)

# TIMETABLE


Vancouver General Hospital



 Taylor Fidler Auditorium

 08:30  1600

Meeting Room, Days:  
1, 2, 4, & 5

Life Sciences Institute

 Room #??

 08:50  1700

LAPTOPS REQUIRED

Day 3

## MONDAY, JANUARY 6, 2014

**THEME - DAY 1:** CONCEPTS IN MOLECULAR BIOLOGY (REVIEW) // **LOCATION:** VGH, TAYLOR FIDLER AUDITORIUM

| TIME      | TITLE  | LECTURER                  |
|-----------|--|---------------------------|
| 0830-0900 | REGISTRATION/HOUSEKEEPING (iClicker assignment ?)  |                           |
| 0900-1010 | Introduction to course/pretest/central dogma and beyond  | Stephen Yip & Sohrab Shah |
| 1010-1025 | DICER aberrations in human cancers - clinical discovery and functional consequences            | Michael S. Anglesio       |
| 1030-1200 | Somatic mutation and cancer and congenital abnormalities and de novo mutations- what is known? | Stephen Yip               |
| 1200-1300 | <b>LUNCH</b>   |                           |
| 1300-1430 | Sequencing technology - from sanger to illumina  | Martin Hirst              |
| 1430-1600 | Impact of advanced diagnostics on society  | Michael M. Burgess        |

## TUESDAY, JANUARY 7, 2014

**THEME - DAY 2:** DIAGNOSTIC TESTS IN ,OMICS' // **LOCATION:** VGH, TAYLOR FIDLER AUDITORIUM

| TIME      | TITLE   | LECTURER             |
|-----------|---|----------------------|
| 0850-0900 | Feedback of 'day 1' talks   |                      |
| 0900-0950 | Survey of practical germline genetic testing  | Intan Schrader       |
| 1000-1050 | Survey of practical somatic mutation testing and pathology considerations (FFPE/ Mol Fx)  | Hector Chang         |
| 1100-1150 | ALK translocation in NSCLC  | Anthony John Lafrate |
|           | <b>BCCA ONCOLOGY GRAND ROUNDS</b>   |                      |
| 1200-1250 | Implementation of clinical somatic mutation testing - The MGH experience                  | Anthony John Lafrate |
| 1330-1420 | Fusion events in malignant gliomas - functional and clinical implications                 | Anthony John Lafrate |
| 1430-1520 | Other molecular diagnostic assays in current pathology use - Oncotype Dx/PAM50/Mammoprint | Torsten Nielsen      |
| 1530-1630 | Personalized Oncogenomics - clinical translation of genomic discoveries                   | Janessa Laskin       |

**WEDNESDAY, JANUARY 8, 2014****THEME - DAY 3:** WHOLE GENOME/TRANSCRIPTOME APPROACHES/LAB DAY // **LOCATION:** THE LIFE SCIENCES INSTITUTE

| TIME      | TITLE   | LECTURER                    |
|-----------|---|-----------------------------|
| 0850-0900 | Feedback of 'Day 2' talks   |                             |
| 0900-0950 | Systems biology approaches to molecular research in cancer - TCGA | Sohrab Shah & Ryan Morin    |
| 1000-1050 | Resources for human genome browsing (UCSC genome browser)         | Ryan Morin                  |
| 1100-1150 | Basic approaches to determining human genome mutation data        | Sohrab Shah & Ryan Morin    |
| 1200-1250 | <b>LUNCH</b>  |                             |
| 1300-1400 | Pharmacogenomics  | Bruce Carleton & Ryan Morin |
| 1400-1500 | Analytical workflow in germline testing                           | Intan Schrader & Ryan Morin |
| 1500-1600 | Data resources for cancer genomics (TCGA portal, etc...)          | Sohrab Shah & Ryan Morin    |
| 1600-1700 | Functional validation (CIITA)                                     | Sohrab Shah & Ryan Morin    |

**THURSDAY, JANUARY 9, 2014****THEME - DAY 4:** MICROBIAL GENOMICS AND METAGENOMICS // **LOCATION:** VGH, TAYLOR FIDLER AUDITORIUM

| TIME      | TITLE  | LECTURER |
|-----------|--|----------|
| 0850-0900 | Feedback of 'Day 3' talks  |          |
| 0930-1020 | Genomics in Medical Microbiology<br>(introduction to concepts, applications and lab methods) | PT??     |
| 1030-1120 | Bioinformatics analysis of microbial WGS data - sequence analysis                            | WH??     |
| 1130-1220 | Bioinformatics analysis of microbial WGS data - comparative genomics                         | WH??     |
| 1230-1320 | <b>LUNCH</b>   |          |
| 1330-1420 | Outbreak investigations using genomics data  | PT??     |
| 1430-1520 | Metagenomics in Medical Microbiology (microbiome and pathogen discovery)                     | PT??     |
| 1630-1650 | Future Directions for Genomics in Microbiology   | PT/WH??  |

**FRIDAY, JANUARY 10, 2014****THEME - DAY 5:** MICROBIAL GENOMICS AND METAGENOMICS // **LOCATION:** VGH, TAYLOR FIDLER AUDITORIUM

| TIME      | TITLE   | LECTURER         |
|-----------|---|------------------|
| 0850-0900 | Feedback of 'Day 4' talks   |                  |
| 0900-1030 | Implementation of advanced molecular diagnostics into everyday pathology practice | Ryan Morin       |
| 1030-1200 | Panel discussion - faculties (SA, DH, MM, SS, SY, TON)                            | DH??             |
| 1230-1330 | PALS - TBC - patient advocate   | Patient advocate |
| 1330-1400 | WRAP UP   | DH??             |