

## Microbiology 406 Research Topics in Virology

**INSTRUCTOR:** Dr. François JEAN

- Associate Professor
- Scientific Director, UBC Facility for Infectious Disease and Epidemic Research (FINDER)
- Email: [fjean@mail.ubc.ca](mailto:fjean@mail.ubc.ca)
- Website: [www.microbiology.ubc.ca/jean](http://www.microbiology.ubc.ca/jean)
- Office: UBC Life Sciences Centre, Room 3559, 2350 Health Sciences Mall, Vancouver, BC V6T 1Z3 Canada

**MICB 406 WEBLINK:** <http://elearning.ubc.ca/connect>

**LECTURES:** Tuesday and Thursday (90 minutes: 11:00 AM- 12:30 PM)

**LOCATION:** Life Sciences Centre (Room 1.410)

**CALENDAR DESCRIPTION:** Specialized, advanced virology course – for students interested in virological research.

**PREREQUISITES:** MICB 202 and MICB 306

### **OVERVIEW:**

This course is designed for a small number of students to maximize student participation, discussion, and individual presentations, with an enrollment cap of 21. I usually present an introduction and overview of the topics selected followed by a discussion and assignment of subtopics to students for further research (2 homework assignments). In the subsequent lectures, we discuss in detail the sub-topics of the research assignment. Each assignment is always challenging and requires important reading and effort from the MICB 406 student. At the end of the course, the students have the opportunity to present a seminar during the MICB 406 Science Symposium (15 min/5 min question period) describing their best homework. In preparation for the symposium, each student is asked to submit an abstract describing their work to be presented and it is enclosed in the final program. The program is distributed prior to the symposium. The students are then asked to evaluate and vote for the best three oral presentations. Based on the student recommendations and my own evaluation of each presentation, I distribute at the end of the term three certificates prepared by the Microbiology and Immunology department underlining their success and effort in MICB 406.

## Microbiology 406 Research Topics in Virology

### OBJECTIVES (Learning & Professional):

- Accomplished by the students by (i) writing two homeworks, (ii) writing a scientific abstract, and (iii) presenting a short talk at the end of term MICB 406 Symposium.
  - MICB 406 Homework (HW) (HW 2013)
    - Developing a new multi-drug regimen for the treatment of HepC/HIV co-infection – a deadly human syndemic
    - Challenging the central dogmas of molecular virology: Predicting the “biggest” Nobel-worthy discovery in the field of molecular virology (Nobel Prize of Medicine 2023)
  - MICB 406 Science Symposium (2013)
    - 10<sup>th</sup> MICB 406 Science Symposium (2013): “Pushing the limits of molecular virology: Field of “Nobel” dreams in virology and antiviral drug discovery

### I. LEARNING OBJECTIVES:

After completing the course a successful student will be able to:

1. Describe the structure/proteome and replication strategies of the individual human enveloped pathogenic viruses discussed (*Flaviviridae*, *Orthomyxoviridae*, and *Retroviridae*), including the processes of entry into cells, control of gene transcription, translation and gene product stability (post-translational modifications), control of and mechanism(s) of genome replication, virion assembly and egress from the cell.
2. Describe and contrast, at the molecular and cellular level, the course taken by different virus infections: (*Flaviviridae*, *Orthomyxoviridae*, and *Retroviridae*)
  - Describe the biology of the complex virus-host interplay
  - Describe the virus's ability to hijack the host cell's machinery
3. Explain at the molecular and cellular levels the concept of pathogenesis in the context of virus infections and describe the molecular determinants of viral pathogenesis: (*Flaviviridae*, *Orthomyxoviridae*, and *Retroviridae*)
4. Explain the scientific basis for therapeutic interventions against human viral diseases (viral targets, viral resistances, combination therapies, and new antiviral development activities including drugs targeted at host-cell pathways)
  - Describe the limitations/pitfalls of current monotherapy and the needs for combination therapy/*multidrug* regimen to become the standard of care
  - Describe new antiviral therapeutic strategies including examples of new (viral and cellular) antiviral targets and associated antiviral drugs.

# Microbiology 406

## Research Topics in Virology

### I. LEARNING OBJECTIVES:

After completing the course a successful student will be able to:

5. Integrate experimental strategies learned in the context of individual viral systems (*Flaviviridae*, *Orthomyxoviridae*, and *Retroviridae*) into the design of experiments involving other related viruses (new emerging or re-emerging human enveloped pathogenic viruses: Dengue virus, West Nile virus, influenza A virus...), and/or important cellular pathways/organelles hijacked during viral infections (e.g., autophagosomes, exosomes, lipid droplets...).

### II. PROFESSIONALISM OBJECTIVES:

#### 1. Seek excellence

- Students strive to excel at all areas of MICB406: HW-1, HW-2, web-based discussion, and MICB 406 Symposium.
- Students read suggested scientific articles to supplement the foundational scaffold of information presented in lecture.
- Students participate regularly in class to provide new insights into the research topics .

#### 2. Perform assignments responsibly and with accountability

- Students work effectively as a team member when assigned HW, realizing they gain more when fully engaged.
- Students complete the two HWs and seminar according to the section schedule.

#### 3. Write clear and concise hypothesis-driven research proposals

- Students write two research proposals according to guidelines provided by instructor (concise CIHR grant proposal).

#### 4. Develop excellent scientific presentation skills: Speaks clearly and uses graphical material effectively

- Students prepare a scientific abstract and present a 15 min oral presentation during the MICB 406 mini-symposium.

### III. EVALUATION

- \*HW-1<sup>#</sup>: Written proposal (CIHR format) – mandatory (30%)
- \*HW-2<sup>#</sup>: Written proposal (CIHR format) – mandatory (30%)
- MICB 406 Symposium
  - \*Scientific abstract – mandatory (10%)
  - \*PowerPoint (slides) – mandatory (10%)
  - \*Oral presentation – mandatory (10%)
- Participation: Sign-in sheet, MICB 406 Discussion Board, and MICB 406 symposium – mandatory (10%)
- (\*) Deadlines are provided – Late Submission Policy = 0%
- (#) Hard copy only – electronic submission will not be accepted

#### **IV. COPYRIGHT REGULATIONS & GUIDELINES IN 2013 – Impact on MICB courses**

Dear students,

As you know, because UBC has terminated its agreement with the Access Copyright consortium (see <http://ubyssey.ca/news/copyright-laws-cause-confusion-on-campus415/>) there are new limitations on the materials that instructors can copy for you, include in course packs, post on VISTA, or show in class. This may affect you in several ways. There may be modest increases in charges for course note packs so that the Department can pay royalty fees for the use of copyrighted materials (the Department will try to absorb some of these costs). In addition, rather than posting copyrighted materials on VISTA, instructors may ask to you to download such material from appropriate electronic links (downloading copies for individual use is allowed under the “fair dealing exception” to the Canadian Copyright Act) or to obtain hard copies from copying services that continue to have printers’ agreements with Access Copyright. How these changes affect a particular course will depend on its use of copyrighted materials and the degree to which specific textbook and journal publishers have granted permission for the use of their materials. We regret these changes, which are beyond the control of your instructors or the Department. To read more about the new Copyright regulations, please see <http://copyright.ubc.ca/copyright-in-the-context-of-teaching/>.

Michael R. Gold, Professor and Head, Dept. of Microbiology and Immunology

**Mobile phones:** Turn off during the class