**Methodology in Research, CPU 2014**

**Class Contact Hours:**

Direct Class Contact Hours: 12 hours

Class Delivery Dates: December 23, and 24, 2014

**Course Instructor:**

**Dr. Jiming Kong**

**Professor, Faculty of Medicine**

**University of Manitoba**

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**Purpose of the Course:**

This course is designed for PhD graduate students in biomedical sciences to learn concepts and practices in conducting scientific research, establish appropriate approaches towards critical thinking and active problem solving, become competent with fundamental research skills, and apply their knowledge and skills to complete two assignments. The student will also learn rules and regulations for graduate studies at University of Manitoba.

**Course content**

The course will consist of 4 lectures.

Lecture 1: Graduate studies at Faculty of Medicine, University of Manitoba

After a brief introduction of the University of Manitoba, I will talk about rules and regulations of graduate studies at our Faculty of Medicine:

* Application to graduate program: Procedures, minimum requirements, required documentation, application fraud or misconduct, special requirements for international applicants, tuition fees, studentships
* Graduate studies committees: departmental graduate studies committee, adversary committee
* Course work requirements
* Academic performance and exposure
* Research proposal:
* PhD candidacy examination
* Regulations on thesis and oral examination

Lecture 2: Research methodology in graduate studies

* Set up high bars for motivation, work ethics
* Establish your knowledge base
* How to critically read a research paper
* Craftsmanship in writing a PhD proposal, research proposal
* Development of research skills
* Thesis writing skills
* Next step: Preparation for a postdoctoral job

Lecture 3: How to develop a research project

I would like to share my experience in establishing my own research program. In my presentation, I will first briefly introduce my research program. Then, I will talk about the BNIP3 cell death pathway that we have been working on in recent 10 years. Using this project as an example, I will talk about the strategies we used to develop a project: patient-oriented research topic, hypothesis-driven experimental design, comprehensive experimental approaches, objectives, controls, data interpretation and translation. I will also discuss factors that need to be considered in establishing a sustainable research program.

Lecture 4: Experimental animal models of human ischemic stroke

This is meant to cover experimental models of stroke currently used in various research laboratories. After brief analysis of pathophysiology of human ischemic stroke, I will move to introduce in vivo and in vitro stroke models with a special emphasis on pros and cons of each model. I will finish with discussions on the role of animal models in leading (misleading) us towards drug discovery.

**Course Objectives:**

Upon completion of this course, the student should be able to:

1. Have a general knowledge of graduate studies of a foreign university.
2. Explain the relationship among class learning, library/lab bench work, scientific evaluation, and data analysis/preparation;
3. Illustrate the principles of critical thinking and active problem solving;
4. Summarize different approaches in establishing proper methodology for:

* Literature search and review
* Scientific critique and writing
* Experiment assessment
* Grant proposal preparation
* Interpersonal communication

1. Complete two assignments: 1) Critical reading of a paper; 2) Writing your research proposal

**Assumed Background:**

This course builds on the knowledge and experience obtained from all previous undergraduate courses. Knowledge and background of scientific evaluation and preparation, and lab-based hands-on experience are essential. Integration and application of information from various courses to complete the assignments is required.

**Teaching and Learning Methods:**

The general aims of the course focus on the fundamental aspects of scientific methodology. Each discussion topic is designed to provide the student with hands-on experience in carrying out various tasks in graduate studies. The student gains knowledge and competence by participating in class discussion and completing written assignments. Students’ active participation in each session is mandatory, and will be accounted into their final course grade.

The entire course will be conducted in English ONLY. The student is expected to participate in class and complete all assignments using English.

**Assessment Program:**

Student’s performance in the course will be assessed based on the following components.

Class Participation/Communication *(Table 1)* **30%**

Two Assignments **70%**

**Table 1. Class Participation/Communication**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **Level 1** | **Level 2** | **Level 3** | **Level 4** |
| **Grading Range** | **<64** | **65-74** | **75-89** | **>90** |
| Learning Attitude | Adequate completion of each session, limited interaction with others. | Satisfactory completion of each session, interact with others where appropriate and necessary. | Complete each session with efficiency, take some initiative in learning and problem-solving. | Consistently complete all sessions with efficiency, take initiatives in learning and problem-solving. |
| Team Work | Cooperate hesitantly with others, limited communication and interaction with others. | Cooperate willingly with others, not always work effectively with others. | Work smoothly with others, contribute equally to class discussion and assignments. | Work efficiently and synergistically with others, take initiatives to contribute to class discussion and assignment. |
| Professionalism | Rarely demonstrate professionalism, require directions and guidance. | Demonstrate professionalism adequately, occasionally require directions and guidance. | Consistently demonstrate professionalism, require no directions and guidance. | Consistently demonstrate exemplary professionalism during class. |