



## Section 5: Teaching and Assessment

**1. Plan**  
**(for students graduated from B.Sc. level)**

|   | <b>Content</b>  | <b>CLO no.</b> | <b>T/L approach</b>  | <b>Assessment Scheme</b>   |
|---|---|----------------|--|--|
| 1 | Introduction to lab dissection  | <b>1</b>       | Lecture; Ethics introduction, Care of cadavers, Laboratory safety, Learning materials: Dissection manual, Cadavers; Models, Charts, Computer programs, Atlas, Radiological imaging | -Evaluation on class participation and student performances;   |
| 2 | Superficial, intermediate and deep layers of back, Laminectomy and spinal cord  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer   | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives. |
| 3 | Pectoral and axilla, Arm and deltoscapular region, Forearm, Hand  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer   | Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 4 | Triangles of neck and structures under sternocleidomastiod  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer   | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives. |
| 5 | Scalp, face and parotid region, Cranial cavities, intradural venous sinuses and brain removal, Temporal and Infratemporal | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer   | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination   |

|    | <b>Content</b>   | <b>CLO no.</b> | <b>T/L approach</b>  | <b>Assessment Scheme</b>   |
|----|--|----------------|--|--|
|    | regions  |                |  | (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 6  | Eye and Ear, Prevertebral region,  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer | Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 7  | Bisection of head: Pharynx and Nasal cavity, Larynx, Oral cavity, and Submandibular region | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer | Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 8  | Thoracic wall and mediastinum, Heart and lung  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer | Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 9  | Abdominal wall and inguinal region,  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives. |
| 10 | Abdominal contents, Posterior abdominal wall and contents                                  | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer | Formative assessment (pre- and post-test)  |

|    | <b>Content</b>  | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>  |
|----|---|----------------|---|---|
|    |   |                |   | -Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.  |
| 11 | Male and Female perinrum, Pelvis                        | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer  | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.                  |
| 12 | Dissection assignment: Gluteal region, Thigh, leg, foot | <b>1, 2, 3</b> | Assignment, self-study, Peer-group teaching, group discussion and presentation, Clinical correlation. Case study with a moral issue addressed | - Quality of dissections<br>-Formative assessment (pre- and post-test)<br>- Evaluation on class participation and student performance using a rubric based on course learning objectives.<br>-Laboratory practice practical examination |
| 13 | Joints of Upper and Lower limbs                         | <b>1,2</b>     | Self-study, Laboratory practice, Group discussion, Question and answer  | -Formative assessment (pre- and post-test)<br>-Laboratory practice practical examination (Summative)<br>-Evaluation on class participation and student performance using a rubric based on course learning objectives.                  |

## 2. Evaluation plan.

| No. | Learning Outcome | Assessment methods  | The proportion of evaluation |
|-----|------------------|---------------------|------------------------------|
| 1   | 1,2,3            | Research assignment | 10%                          |
| 2   | 2,3              | Written examination | 70%                          |
| 3   | 1,2,3            | Group discussions   | 15%                          |
| 4   | 2                | Quiz                | 5%                           |

Students must receive B grade to pass the course

**Appeal Procedure**

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## Course Syllabus

**SCAN523 Structure and Development of Human Body**

Name of Institute Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

**Section 1 Overview**

1. **Course title and code** SCAN523 Structure and Development of Human Body.
2. **Credits** 3 (3-0-6) Credits (lecture - practice - self-study).
3. **Course type**  
Required course.
4. **Course Coordinator**  
4.1 Course coordinator  
1. Dr. Krai Meemon
5. **Semester / Year of study.**  
Semester 1 / 1st year
6. **Pre-requisite courses.** none
7. **Co-requisite courses.** none
8. **Place** Department of Anatomy
9. **Last update.** 11 August 2560

**Section 2: Aims of Course.****1. Aims of Course**

The course provides knowledge and skills involving:

- 1.1 developmental process of human body in the systematic orientation.
- 1.2 gross structures of all human body systems in relation to their functions.
- 1.3 clinical correlation or organ defect of the given cases in each system.

**Section 3 Course Description****1. Description**

Structure and function of multi-organ systems in human body; normal developmental patterns of organs and organ systems; developmental defects, applications and clinical relevances.

**Section 4: Course Learning Outcomes**

(For students graduated from B.Sc. level)

At the end of the course, the student will be able to:

- |               |   |                     |
|---------------|---|---------------------|
| <b>CLO 1:</b> | Describe the structure of the human body systematically and relate it to functions      | <b>(ELO1,2,5,7)</b> |
| <b>CLO 2:</b> | Describe the development process of the human system in a systematic way                | <b>(ELO1,2,5,7)</b> |
| <b>CLO 3:</b> | Apply basic knowledge to explain clinical pathology or organ dysfunction in each system | <b>(ELO2,7)</b>     |

## Section 5: Teaching and Assessment

### 1. Plan (for students graduated from B.Sc. level)

|   | Content  | CLO no. | T/L approach  | Assessment Scheme   |
|---|--|---------|---|---|
| 1 | Introduction, Vertebral column, Muscles of back, Spinal cord and meninges  | 1,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 2 | Pectoral region and deltoscapular region, Axilla and brachial plexus, Arm, cubital fossa and forearm, Hand, Joints of upper limb           | 1,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 3 | Overview of human embryonic development  | 2,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 4 | Anterior and posterior triangles of neck, Deep structures in neck, Scalp and face, Cranial cavity and intradural venous sinus, Eye and ear | 1,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 5 | Temporal and Infratemporal regions; Nose, nasal air sinus and mouth; Pharynx and Larynx; Prevertebral region                               | 1,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 6 | Conference in autonomic nervous system   | 1,2,3   | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |
| 7 | Thoracic wall and lung; Heart and pericardium; Mediastinum and its contents)   | 1,3     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |

|    | <b>Content</b>   | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>  |
|----|--|----------------|---|---|
| 8  | Abdominal wall and peritoneum; Inguinal and scrotal regions; Abdominopelvic cavity and internal organs; Posterior abdominal wall and contents) | <b>1,3</b>     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 9  | Conference in Thorax and Abdomen disorders   | <b>1,2,3</b>   | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |
| 10 | Male and Female Perineum; Pelvis   | <b>1,3</b>     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 11 | Conference in neuromuscular disorder of lower limb   | <b>1,2,3</b>   | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |

## 2. Evaluation plan.

| No. | Learning Outcome* | Assessment methods  | The proportion of evaluation |
|-----|-------------------|---------------------|------------------------------|
| 1   | 1,2,3             | Written examination | 70%                          |
| 2   | 1,2,3             | Group discussions   | 15%                          |
| 3   | 1,2               | Quiz                | 5%                           |
| 4   | 1,2               | Research assignment | 10%                          |

Students must receive B grade to pass the course

### **Appeal Procedure**

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.



Course Syllabus  
**SCAN502 Structural Neurobiology**  
 Institution Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

### Section 1 Overview

1. **Course title and code** SCAN502 Structural Neurobiology
2. **Credits** 3 (2-3-5) Credits (Lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Assoc. Prof. Charoensri Thonabulsombat
5. **Semester / Year of study**  
First semester / 1st year
6. **Pre-requisite course.** none
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** June 14, 2561

### Section 2: Aim of Course.

#### 1. The aim of the course

The course provides knowledge and skills involving

1.1 Development of the nervous system and anatomy of the brain that are important for the arrangement of the different areas of the brain that control movement and get a feel for primary and secondary. The relationship between the cortex and sub-cortex.

1.2 Function of the brain and the cortex. The signs and symptoms of pathological conditions including headache, increased intracranial pressure, brain tumors, and hydrocephalus syndrome.

1.3 Motor systems, autonomic nervous system and sensory system. Symptoms caused by the pathology, including hemiparesis.

1.4 Brain stem and cranial nerves. Signs and symptoms caused by pathological changes include loss of feeling and movement control in the face, hearing, vision and speech and so on.

1.8 Higher brain function

### Section 3 Course Description

#### 1. Description

Structure composition and development of human nervous system; functional organization in related to the structure of central nervous system; brain and spinal cord, brainstem, thalamus and hypothalamus, basal ganglia, cerebellum, cranial nerves, limbic system, cerebral circulation, ventricular system; pathways of sensory and motor systems

## Section 4: Course Learning Outcomes

(For students graduated from B.Sc. level)

At the end of the course, the student will be able to:

- CLO 1:** Describe development of the nervous system and anatomy of the brain (ELO1,2,5,7)
- CLO 2:** Describe structure and functions of ventricular system and meninges, including symptoms and signs of their pathology (ELO1,2,5,7)
- CLO 3:** Describe structure, function, and neuronal regulation of the spinal cord, motor system, thalamus, autonomic nervous system and sensory systems, including their symptoms and signs of their pathology (ELO1,2,5,7)
- CLO 4:** Describe structure and functions of brainstem and cranial nerves, their symptoms and signs of their pathology (ELO1,2,5,7)
- CLO 5:** Describe structure and functions of cerebellum, and its symptoms and signs of their pathology (ELO1,2,5,7)
- CLO 6:** Describe structure and functions of basal ganglia, and its symptoms and signs of their pathology (ELO1,2,5,7)
- CLO 7:** Describe structure, function, and neural pathways of the limbic system, specially hippocampus and amygdala, including its symptoms and signs of pathology (ELO1,2,5,7)
- CLO 8:** Describe structure and functions of the cerebral cortex and its high-level functions including language and behavioral planning, including its symptoms and signs of pathology (ELO1,2,5,7)
- CLO 9:** Apply knowledge of the nervous system to explain symptoms and signs of pathology caused by various etiologies (ELO2,7)
- CLO 10:** Discuss wisely on research in the field of neurobiology (ELO2,7)

## Section 5: Teaching and Assessment

1. Plan

(for students graduated from B.Sc. level)

|   | Content   | CLO no. | T/L approach  | Assessment Scheme  |
|---|---|---------|---|--|
| 1 | Introduction, Overview and Organization of NS and Spinal Cord | 1,3,9   | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 2 | Ventricles, Meninges and Neurovasculature                     | 2,9     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 3 | Brainstem and   | 4,9     | Lecture using Powerpoint;   | -Formative assessment  |

|   | <b>Content</b>   | <b>CLO no.</b> | <b>T/L approach</b>  | <b>Assessment Scheme</b>   |
|---|--|----------------|--|--|
|   | Cranial nerves   |                | lecture handout;<br>Discussion; Suggested textbook and atlas<br>Self-study; Conference;<br>Oral presentation; Group discussion; Case study with ethical and moral issues                           | (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation                       |
| 4 | Diencephalon, Somatosensory and Viscerosensory Pathways                  | <b>3,9</b>     | Lecture using Powerpoint; lecture handout;<br>Discussion; Suggested textbook and atlas<br>Self-study; Conference;<br>Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 5 | Visual, Auditory and Vestibular Systems                                  | <b>3,9</b>     | Lecture using Powerpoint; lecture handout;<br>Discussion; Suggested textbook and atlas<br>Self-study; Conference;<br>Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 6 | Motor System, Basal Nuclei and Cerebellum                                | <b>3,5,6,9</b> | Lecture using Powerpoint; lecture handout;<br>Discussion; Suggested textbook and atlas<br>Self-study; Conference;<br>Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 7 | Visceral Motor Pathways, Hypothalamus, Limbic System and Cerebral Cortex | <b>7,8,9</b>   | Lecture using Powerpoint; lecture handout;<br>Discussion; Suggested textbook and atlas<br>Self-study; Conference;<br>Oral presentation; Group discussion; Case study with ethical and moral issues | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |

## 2. Evaluation plan

| No. | Learning Outcome       | The proportion of evaluation |
|-----|------------------------|------------------------------|
| 1   | 1,2,3,4,5,6,7,8,9      | 50%                          |
| 2   | 1,2,3,4,5,6,7,8,9 (10) | 20%                          |
| 3   | 1,2,3,4,5,6,7,8,9 (10) | 30%                          |

Students must receive B grade to pass the course

**Appeal Procedure**

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

Course Syllabus  
**SCAN522 Structural Biology of Cell and Tissue**  
 Institution Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

### Section 1 Overview

1. **Course title and code** SCAN522 Structural Biology of Cell and Tissue
2. **Credits** 3 (2-3-5) Credits (lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Kulathida Chaithirayanon
5. **Semester / Year of study.**  
First semester / 1st year
6. **Pre-requisite course.** none
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** June 27, 2561

### Section 2: Aim of Course.

#### 1. The aim of the course

- The course provides knowledge and skills involving
- 1.1 Organization of the cells, tissues, organs and organ in the human body.
  - 1.2 Structure of tissues and organs using light microscopy in the cellular and molecular level.
  - 1.3 Relationship between structure and function of cells, tissues and organs
  - 1.4 Dysfunction of the organs in the system.
  - 1.5 Research of various systems.

### Section 3 Course Description

#### 1. Description

Structural and molecular-cellular organization and functions of epithelium, connective tissue, muscles, nervous tissue, eye, ear, cartilage, bone, blood, integument system, digestive system, cardiovascular system, immune system, respiratory system, urinary system, endocrine system and. reproductive system

### Section 4: Course Learning Outcomes

**(For students graduated from B.Sc. level)**

**At the end of the course, the student will be able to:**

- CLO 1:** Describe and analyze the characteristics of microscopic instrument used to study the organization of cell, organ and tissue in relation to the entire organ in the human body **(ELO2,4,7)**
- CLO 2:** Describe and analyze the structure and organization of tissues and organs using light microscopy or transmission electron microscopy **(ELO2,4,7)**

- at the cellular and molecular levels
- CLO 3:** Analyze the relationship between structure and function of cells, tissues and organs **(ELO2,4,7)**
- CLO 4:** Apply microscopic knowledge to describe clinical pathology or organ dysfunction in each system **(ELO4,5,7)**
- CLO 5:** Analyze the research of various systems involving microscopic anatomy **(ELO1,4,5,7)**

## Section 5: Teaching and Assessment

### 1. Plan

(for students graduated from B.Sc. level)

|   | Content   | CLO no. | T/L approach  | Assessment Scheme   |
|---|---|---------|---|---|
| 1 | Introduction, Basic Microscopy and Specimen Preparation | 1       | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 2 | Epithelium  | 1,2,3,4 | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 3 | Connective Tissue                                       | 1,2,3,4 | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 4 | Muscular tissue   | 1,2,3,4 | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 5 | Nervous tissue  | 1,2,3,4 | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 6 | Cartilage and Bone                                      | 1,2,3,4 | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |
| 7 | Blood Cells; Life Cycle of Blood Cells                  | 1,2,3,4 | Lecture using Powerpoint; lecture handout; Discussion;  | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)                                       |

|    | <b>Content</b>                            | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>  |
|----|---|----------------|---|---|
|    |   |                | Suggested textbook and atlas  | -Evaluation on class participation  |
| 8  | Blood Vascular System                     | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 9  | Microanatomy of Lymphoid System           | <b>1,2,3,4</b> | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |
| 10 | Microanatomy of Eye and Ear               | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 11 | Microanatomy of Integumentary System      | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 12 | Microanatomy of Digestive System          | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 13 | Microanatomy of Respiratory System        | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 14 | Microanatomy of Urinary system            | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 15 | Microanatomy of Endocrine System          | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 16 | Microanatomy of Male Reproductive System: | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture   | -Formative assessment (pre- and post-test)  |

|    | <b>Content</b>   | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>  |
|----|--|----------------|---|---|
|    | Testis, Genital Ducts and Accessory Glands               |                | handout; Discussion; Suggested textbook and atlas   | -Written exam (Summative)<br>-Evaluation on class participation   |
| 17 | Microanatomy of Female Reproductive System               | <b>1,2,3,4</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 11 | Conference in research involving microscopic anatomy and | <b>5</b>       | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |

## 2. Evaluation plan

| No. | Learning Outcome | The proportion of evaluation |
|-----|------------------|------------------------------|
| 1   | 1,2,3,4          | 80%                          |
| 2   | 1,2,3,4,5        | 10%                          |
| 3   | 5                | 10%                          |

Students must receive B grade to pass the course

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.



## Course Syllabus

### SCAN606 Advanced Topics in Cellular and Structural Biology

Institution Mahidol University

Faculty / Department Faculty of Science Department of Anatomy

#### Section 1 Overview

1. **Course title and code**      SCAN606 Advanced Topics in Cellular and Structural Biology.
2. **Credits**      1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Assist. Prof. Dr. Rapeepun varnichviriyakit
5. **Semester / Year of study.**  
Semester Year -
6. **Pre-requisite course.** none
7. **Co-requisite course:** none
8. **Place**      Department of Anatomy
9. **Last update.**      September 4th 2558

#### Section 2: Aim of Course.

##### 1. The aim of the course

The course provides knowledge and skills involving

1.1 structural biology of cell, tissue and organs involving skin, connective tissue, muscle, bone, cartilage, neural tissue, blood cells, heart, blood vessels, digestive system, respiratory system, urinary system, reproductive system and endocrine;

1.2 relationship between structure and function based on the organization and mechanisms at cellular and molecular levels;

1.3 significance and impact of research findings; interpretation of reported data by critical reading and thinking; future development of technologies; ethical and moral implications of research.

#### Section 3 Course Description

##### 1. Description

Advanced knowledge in the structural biology of cell, tissue and organs involving skin, connective tissue, muscle, bone, cartilage, neural tissue, blood cells, heart, blood vessels, digestive system, respiratory system, urinary system, reproductive system and endocrine; relationship between structure and function based on the organization and mechanisms at cellular and molecular levels; significance and impact of research findings; interpretation of reported data by critical reading and thinking; future development of technologies; ethical and moral implications of research

### Section 4: Course Learning Outcomes

At the end of the course, the student will be able to:

- CLO 1:** Search, analyse, and criticise research data from reliable publications in the field of cellular and structural biology **(ELO2,4,6,7)**
- CLO 2:** Understand how to write a research article for the publication on cell and tissue biology in various academic journals. **(ELO1,7)**
- CLO 3:** Present scientific research data and answer the relevant questions **(ELO2,4,6,7)**
- CLO 4:** Practice and develop presentation skill and scientific writing skill **(ELO2,4,6,7)**
- CLO 5:** Evaluate the ethical validity of the proposed research **(ELO2,4,6,7)**

### Section 5: Teaching and Assessment

#### 1. Plan

|   | Content  | CLO no. | T/L approach   | Assessment Scheme  |
|---|--|---------|--|--|
| 1 | Orientation and Introduction<br>- Cellular and structural biology publications<br>- How to evaluate the quality of a scientific publication and make critical judgment on its findings and conclusions | 1,2     | Introductory lecture;<br>Discussion; Group discussion  | -Evaluation on participation using rubric  |
| 2 | How to write scientific papers/proposals/theses using EndNote  | 2       | Introductory lecture;<br>Discussion; Group discussion  | -Evaluation on participation using rubric  |
| 3 | Tutorials for searching for scientific papers/proposals/theses<br>- How to give a good & bad talk  | 2       | Introductory lecture;<br>Discussion; Group discussion  | -Evaluation on participation using rubric  |
| 4 | Seminar - epithelium, skin and connective tissue   | 1,3,4,5 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 5 | Seminar - cartilage and bone   | 1,3,4,5 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 6 | Seminar - neural tissue and muscular tissue  | 1,3,4,5 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 7 | Seminar - lymphoid system and blood cells  | 1,3,4,5 | Conference;<br>Oral presentation;<br>Group discussion;   | -Evaluation of assignment, presentation using rubrics  |

|    | <b>Content</b>                       | <b>CLO no.</b> | <b>T/L approach</b>  | <b>Assessment Scheme</b>   |
|----|--------------------------------------|----------------|--|--|
|    |                                      |                | Case study with ethical and moral issues   | -Evaluation on participation and discussion using rubrics  |
| 8  | Seminar - heart and blood vessel     | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 9  | Seminar - digestive system           | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 10 | Seminar - respiratory system         | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 11 | Seminar - urinary system             | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 12 | Seminar - endocrine system           | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 13 | Seminar - male reproductive system   | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 14 | Seminar - female reproductive system | <b>1,3,4,5</b> | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |

## 2. Evaluation plan

| No. | Learning Outcome | Assessment methods                                  | The proportion of evaluation |
|-----|------------------|---|------------------------------|
| 1   | 1,2,3,4,5        | Content of and performance of research presentation | 80%                          |
| 2   | 1,2,3,4,5        | Class attention                                     | 10%                          |
| 3   | 1,2,3,4,5        | Assignment  | 10%                          |

Students must receive B grade to pass the course

**Appeal Procedure**

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

Course Syllabus  
**SCAN615 Advanced Topics in Neuroscience**  
 Institution Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

### Section 1 Overview

1. **Course title and code** SCAN615 Advanced Topics in Neuroscience
2. **Credits** 1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Assoc. Prof. Dr. Permphan Dharmasaroja
5. **Semester / Year of study.**  
First and second semester / 1<sup>st</sup> year
6. **Pre-requisite course.** none
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** August 10, 2560

### Section 2: Aim of Course.

1. **The aim of the course**  
The course provides knowledge and skills involving
  - 1.1 research topics in contemporary neuroscience, molecular neuroscience and cellular neuroscience involving sensory system, motor system, cognitive function, neuroendocrine,
  - 1.2 degeneration and regeneration of neural cells;
  - 1.3 significance and impact of research findings; interpretation of reported data by critical reading and thinking; future development of technologies; ethical and moral implications of neuroscience research

### Section 3 Course Description

1. **Description**  
Advanced knowledge in neuroscience research. Research topics in contemporary neuroscience, molecular neuroscience and cellular neuroscience involving sensory system, motor system, cognitive function, neuroendocrine, degeneration and regeneration of neural cells; significance and impact of research findings; interpretation of reported data by critical reading and thinking; future development of technologies; ethical and moral implications of neuroscience research.

### Section 4: Course Learning Outcomes

**At the end of the course, the student will be able to:**

- |               |  |                       |
|---------------|--|-----------------------|
| <b>CLO 1:</b> | Search, analyse, and criticise research data from reliable publications in the field of neuroscience | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 2:</b> | Present scientific research data and answer the relevant questions                                   | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 3:</b> | Practice and develop presentation skill and scientific writing                                       | <b>(ELO1,2,4,6,7)</b> |

skill  
**CLO 4:** Evaluate the ethical validity of the proposed research

**(ELO1,2,4,6,7)**

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content                                    | CLO no.        | T/L approach   | Assessment Scheme  |
|---|--|----------------|--|--|
| 1 | Current knowledge in neuroscience research | <b>1</b>       | Introductory lecture; Discussion; Group discussion; Case study with ethical and moral issues | -Evaluation on participation using rubric  |
| 2 | Neuroscience Seminar -1                    | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues    | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 3 | Neuroscience Seminar - 2                   | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues    | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 4 | Neuroscience Seminar -3                    | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues    | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 5 | Neuroscience Seminar -4                    | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues    | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |

### 2. Evaluation plan

| No. | Learning Outcome | Assessment methods                                  | The proportion of evaluation |
|-----|------------------|---|------------------------------|
| 1   | 1,2,3,4          | Content of and performance of research presentation | 70%                          |
| 2   | 1                | Class attention                                     | 10%                          |
| 3   | 1,3,4            | Assignment  | 20%                          |

Students must receive B grade to pass the course

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## Course Syllabus

**SCAN617 Seminar in Frontier Research of Anatomy and Structural Biology I**

Name of Institute                      Mahidol University  
 Faculty / Department                Faculty of Science Department of Anatomy

**Section 1 Overview**

1. **Course title and code**                SCAN617 Seminar in Frontier Research of Anatomy and Structural Biology I
2. **Credits**                      1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course type**  
    Required course.
4. **Course Coordinator**  
    4.1 Course coordinator  
    1.. Dr. Sittipon Intarapat
5. **Semester / Year of study.**  
    Semester 1 / 1st year
6. **Pre-requisite courses.** none
7. **Co-requisite courses.** none
8. **Place**                        Department of Anatomy
9. **Last update.**                11 August 2560

**Section 2: Aims of Course.****1. Aims of Course**

- The course provides knowledge and skills involving
- 1.1 critical analysis of research data on topics of interest from reliable publications.
  - 1.2 presentation of the results of scientific research.
  - 1.3 developing skills both oral research presentations. And good writing

**Section 3 Course Description****1. Description**

International peer-reviewed research papers in the advanced fields of anatomy and structural biology; guidelines for summarizing scientific finding, criticizing the strong and weak points of research papers; guidelines for active interaction and discussion to research community.

**Section 4: Course Learning Outcomes**

**At the end of the course, the student will be able to:**

- |               |  |                       |
|---------------|--|-----------------------|
| <b>CLO 1:</b> | Search, analyse and criticise of research data on topics of interest in the field of anatomy and structural biology from reliable publications | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 2:</b> | Present scientific research data, and answer related questions   | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 3:</b> | Practice and develop presentation skill and scientific writing skill   | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 4:</b> | Evaluate the ethical validity of the proposed research   | <b>(ELO1,2,4,6,7)</b> |

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content   | CLO no. | T/L approach   | Assessment Scheme  |
|---|---|---------|--|--|
| 1 | Searching scientific papers and Preparation for presentation of research papers and abstracts | 1       | Introductory lecture;<br>Discussion; Question and answer session                                   | -Evaluation on participation using rubric  |
| 2 | Presentation of research papers and interactive discussions -1                                | 1,2,3,4 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 3 | Presentation of research papers and interactive discussions -2                                | 1,2,3,4 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 4 | Presentation of research papers and interactive discussions -3                                | 1,2,3,4 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 5 | Presentation of research papers and interactive discussions -4                                | 1,2,3,4 | Conference;<br>Oral presentation;<br>Group discussion;<br>Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |

### 2. Evaluation plan.

| No. | Learning Outcome | Assessment methods    | The proportion of evaluation |
|-----|------------------|-----------------------|------------------------------|
| 1   | 1,2,4            | - Content of research | 80%                          |
| 2   | 3                | - Presentation        | 10%                          |
| 3   | 3                | - Abstract writing    | 10%                          |

Students must receive B grade to pass the course

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.



## Course Syllabus

### SCAN618 Seminar in Frontier Research of Anatomy and Structural Biology II

Institution Mahidol University

Faculty / Department Faculty of Science Department of Anatomy

#### Section 1 Overview

1. **Course title and code** SCAN618 Seminar in Frontier Research of Anatomy and Structural Biology II
2. **Credits** 1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Dr. Somyoth Sridurongrit
5. **Semester / Year of study.**  
Second semester / 1<sup>st</sup> year: students from Master's degree  
Second semester / 2<sup>nd</sup> year: students from bachelor's degree
6. **Pre-requisite course.** SCAN617
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** 11 August 2560

#### Section 2: Aim of Course.

##### 1. The aim of the course

The course provides knowledge and skills involving

- 1.1 research updates on topics of interest from reliable publications
- 1.2 presenting the results of scientific research, generating questions and answers related to the research papers
- 1.3 skills both oral research presentations, and good writing skills

#### Section 3 Course Description

##### 1. Description

International peer-reviewed research papers in the advanced fields of anatomy and structural biology; guidelines for summarizing scientific finding, criticizing the strong and weak points of research papers; guidelines for proposing the experiments related to the presented articles to promote the strong points and to improve the weak points; guidelines for active interaction and discussion to research community.

#### Section 4: Course Learning Outcomes

**At the end of the course, the student will be able to:**

- |               |  |                       |
|---------------|--|-----------------------|
| <b>CLO 1:</b> | Search, analyse and criticise of research data on topics of interest in the field of anatomy and structural biology from reliable high-impact publications | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 2:</b> | Effectively present scientific research data, and knowledgeably answer related questions   | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 3:</b> | Practice and develop good presentation and scientific writing  | <b>(ELO1,2,4,6,7)</b> |

skills  
**CLO 4:** Appropriately evaluate the ethical validity of the proposed research

**(ELO1,2,4,6,7)**

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content   | CLO no.        | T/L approach  | Assessment Scheme  |
|---|---|----------------|---|--|
| 1 | Searching high-impact scientific papers and preparation for presentation of research papers and abstracts | <b>1</b>       | Introductory lecture; Discussion; Question and answer session                             | -Evaluation on participation using rubric  |
| 2 | Presentation of research papers and interactive discussions -1  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 3 | Presentation of research papers and interactive discussions -2  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 4 | Presentation of research papers and interactive discussions -3  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 5 | Presentation of research papers and interactive discussions -4  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |

### 2. Evaluation plan

| No. | Learning Outcome | Assessment methods                                  | The proportion of evaluation |
|-----|------------------|---|------------------------------|
| 1   | 1,2,4            | Content of and performance of research presentation | 80%                          |
| 2   | 1,2,4            | Class attention                                     | 10%                          |
| 3   | 3                | Assessment of abstract writing                      | 10%                          |

Students must receive B grade to pass the course

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## Course Syllabus

### SCAN619 Seminar in Frontier Research of Anatomy and Structural Biology III

Institution Mahidol University

Faculty / Department Faculty of Science Department of Anatomy

#### Section 1 Overview

1. **Course title and code** SCAN619 Seminar in Frontier Research of Anatomy and Structural Biology III
2. **Credits** 1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course Type**  
Required course
4. **Course coordinator**  
4.1 Course coordinator  
1. Dr. Somyoth Sridurongrit
5. **Semester / Year of study.**  
First semester / 2<sup>nd</sup> year: students from Master's degree  
First semester / 3<sup>rd</sup> year: students from bachelor's degree
6. **Pre-requisite course.** SCAN617, SCAN618
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** 11 August 2560

#### Section 2: Aim of Course.

##### 1. The aim of the course

The course provides knowledge and skills involving

- 1.1 research updates on topics of interest from reliable publications
- 1.2 presenting the results of scientific research, generating questions and answers related to the research papers
- 1.3 skills both oral research presentations, and good writing skills

#### Section 3 Course Description

##### 1. Description

International peer-reviewed research papers in the advanced fields of anatomy and structural biology; guidelines for summarizing scientific finding, criticizing the strong and weak points of research papers; guidelines for systematic creation of the experiments to advance knowledge of the presented articles; guidelines for active interaction and discussion to research community.

#### Section 4: Course Learning Outcomes

**At the end of the course, the student will be able to:**

- |               |  |                       |
|---------------|--|-----------------------|
| <b>CLO 1:</b> | Appropriately search, analyse and criticise of research data on topics of interest in the field of anatomy and structural biology from reliable high-impact publications | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 2:</b> | Effectively present scientific research data, and knowledgeably answer related questions   | <b>(ELO1,2,4,6,7)</b> |
| <b>CLO 3:</b> | Practice and develop excellent presentation and scientific writing   | <b>(ELO1,2,4,6,7)</b> |

skills  
**CLO 4:** Appropriately evaluate the ethical validity of the proposed research

**(ELO1,2,4,6,7)**

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content   | CLO no.        | T/L approach  | Assessment Scheme  |
|---|---|----------------|---|--|
| 1 | Searching high-impact scientific papers and preparation for presentation of research papers and abstracts | <b>1</b>       | Introductory lecture; Discussion; Question and answer session                             | -Evaluation on participation using rubric  |
| 2 | Presentation of research papers and interactive discussions -1  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 3 | Presentation of research papers and interactive discussions -2  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 4 | Presentation of research papers and interactive discussions -3  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |
| 5 | Presentation of research papers and interactive discussions -4  | <b>1,2,3,4</b> | Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation using rubrics<br>-Evaluation on participation and discussion using rubrics |

### 2. Evaluation plan

| No. | Learning Outcome | Assessment methods                                  | The proportion of evaluation |
|-----|------------------|---|------------------------------|
| 1   | 1,2,4            | Content of and performance of research presentation | 80%                          |
| 2   | 1,2,4            | Class attention                                     | 10%                          |
| 3   | 3                | Assessment of abstract writing                      | 10%                          |

Students must receive B grade to pass the course

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## ELECTIVE COURSES

### Course Syllabus

#### SCAN620 Selected Topics in Cellular Neuroscience

Name of Institute                      Mahidol University  
 Faculty / Department                Faculty of Science Department of Anatomy

### Section 1 Overview

1. **Course title and code**            SCAN620 Selected Topics in Cellular Neuroscience
2. **Credits**                    1 (1-0-2) Credits (lecture - practice - self-study).
3. **Course type**  
     Elective course
4. **Course Coordinator**  
     4.1 Course coordinator  
         1. Assoc. Prof. Dr. Permphan Dharmasaroja
5. **Semester / Year of study.**  
     First and second semesters / Any year
6. **Pre-requisite courses.** none
7. **Co-requisite courses.** none
8. **Place**                    Department of Anatomy
9. **Last update.**            August 10, 2560

### Section 2: Aims of Course.

#### 1. Aims of Course

The course provides knowledge and skills involving

- 1.1 Markers of specific neuron types.
- 1.2 Neurotransmitters and receptors, and clinical relevance.
- 1.3 Application of neural cell lines.
- 1.4 Mechanisms of neuronal injury.
- 1.5 Mechanism of regeneration of neurons.
- 1.6 Experimental models of various neurological diseases.

### Section 3 Course Description

#### 1. Description

Neural marker, neurotransmitter, neural cell line, application of neural cell line, mechanisms of neuronal injury, mechanisms of neuronal regeneration, experimental models of neurological diseases.

### Section 4: Course Learning Outcomes

**At the end of the course, the student will be able to:**

- |               |   |                   |
|---------------|---|-------------------|
| <b>CLO 1:</b> | Analyze specific markers for various neurons including their functions and applications | <b>(ELO2,4,5)</b> |
| <b>CLO 2:</b> | Relate neurotransmitters and their receptors with related clinical relationships        | <b>(ELO2,4,5)</b> |
| <b>CLO 3:</b> | Analyze the application of neural cell lines  | <b>(ELO2,4,5)</b> |
| <b>CLO 4:</b> | Analyze mechanisms of neuronal injury   | <b>(ELO2,4,5)</b> |

**CLO 5:** Analyze mechanisms of neuronal regeneration

**(ELO2,4,5)**

**CLO 6:** Analyze and give examples of experimental models of various neurological diseases

**(ELO2,4,5)**

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content   | CLO no.            | T/L approach  | Assessment Scheme   |
|---|---|--------------------|---|---|
| 1 | Introduction, Neural markers                                      | <b>1</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 2 | Neurotransmitters and their receptors                             | <b>2</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 3 | Neural cell lines: neuronal, glial                                | <b>3</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 4 | Application of neural cell lines                                  | <b>3</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 5 | Mechanisms of neuronal injuries: oxidative stress, apoptosis      | <b>4</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 7 | Mechanisms of neuronal regeneration and synaptic plasticity       | <b>5</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 8 | Experimental models of neurological diseases: PD, AD, stroke, SCI | <b>6</b>           | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and research papers | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 9 | Paper discussion  | <b>1,2,3,4,5,6</b> | Conference; Oral presentation; Group  | -Evaluation of assignment, presentation and class   |

|  | Content | CLO no. | T/L approach   | Assessment Scheme |
|--|---------|---------|--|-------------------|
|  |         |         | discussion; Case study with ethical and moral issues | participation     |

## 2. Evaluation plan.

| No. | Learning Outcome | Assessment methods     | The proportion of evaluation |
|-----|------------------|------------------------|------------------------------|
| 1   | 1,2,3,4,5,6      | - MCQ<br>- Short essay | 75%                          |
| 2   | 1,2,3,4,5,6      | - Paper assignment     | 20%                          |
| 3   | 1,2,3            | - Pretest and posttest | 5%                           |

### Grading Criteria

|        |    |
|--------|----|
| 80-100 | A  |
| 70-79  | B+ |
| 60-69  | B  |

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## Course Syllabus

**SCAN622 Human Embryonic Development**

Name of Institute Mahidol University  
Faculty / Department Faculty of Science Department of Anatomy

**Section 1 Overview**

1. **Course title and code** SCAN622 Human Embryonic Development
2. **Credits** 2 (2-0-4) Credits (lecture - practice - self-study).
3. **Course type**  
Elective course
4. **Course Coordinator**  
4.1 Course coordinator  
1. Dr. Krai Meemon
5. **Semester / Year of study.**  
Semester 1 / 1st year
6. **Pre-requisite courses.** none
7. **Co-requisite courses.** none
8. **Place** Department of Anatomy
9. **Last update.** July 28, 2560

**Section 2: Aims of Course.****1. Aims of Course**

The course provides knowledge and skills involving

- 1.1 gamete development process and development of the human embryo at an early stage.
- 1.2 development of the embryo, placenta and membranes have.
- 1.3 bone development, musculoskeletal system, nervous system, head and neck, ears, eyes and cardiovascular system, body cavity and respiratory system digestive system
- 1.4 developmental abnormalities

**Section 3 Course Description****1. Description**

Gametogenesis and early human embryonic development process; development of placenta and extraembryonic membrane; development of skeletal system; muscular system; nervous system; head and neck; eye and ear; cardiovascular system; body cavities and respiratory system; digestive system; urinary system; and reproductive system; developmental disorders and fetal anomaly

**Section 4: Course Learning Outcomes**

**At the end of the course, the student will be able to:**

- CLO 1:** Describe gametogenesis and early human embryonic development (ELO2,4,5)  
**CLO 2:** Describe placenta and extraembryonic membranes (ELO2,4,5)  
**CLO 3:** Describe the developmental process in musculoskeletal system, (ELO2,4,5)



nervous system, head and neck, eye and ear, cardiovascular system, body cavity and respiratory system, digestive system, urogenital system

**CLO 4:** Describe the developmental disorders and fetal anomaly

**(ELO2,4,5,7)**

### Section 5: Teaching and Assessment

#### 1. Plan

|   | <b>Content</b>   | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>  |
|---|--|----------------|---|---|
| 1 | Gametogenesis, fertilization and implantation                  | 1              | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 2 | The second to eight week of development                        | 1              | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 3 | Fetus, placenta and prenatal diagnosis                         | 2              | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 4 | Developmental disorders  | 4              | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 5 | Development of integumentary and musculoskeletal system        | 3,4            | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 6 | Development of nervous system                                  | 3,4            | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 7 | Conference I: Early development in experimental model organism | 1,2,3,4        | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |
| 9 | Development of head and neck                                   | 3,4            | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and                         | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)                                       |

|    | Content   | CLO no. | T/L approach  | Assessment Scheme   |
|----|---|---------|---|---|
|    |   |         | atlas   | -Evaluation on class participation  |
| 10 | Development of eye and ear                          | 3,4     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 11 | Development of body cavities and respiratory system | 3,4     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 12 | Development of cardiovascular system                | 3,4     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 13 | Development of digestive system                     | 3,4     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 14 | Development of urogenital system                    | 3,4     | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas                   | -Formative assessment (pre- and post-test)<br>-Written exam (Summative)<br>-Evaluation on class participation |
| 15 | Conference II: Developmental disorder               | 1,2,3,4 | Self-study; Conference; Oral presentation; Group discussion; Case study with ethical and moral issues | -Evaluation of assignment, presentation and class participation   |

## 2. Evaluation plan.

| No. | Learning Outcome | Assessment methods    | The proportion of evaluation |
|-----|------------------|-----------------------|------------------------------|
| 1   | 1,2,3,4          | - observation         | 10%                          |
| 2   | 1,2,3,4          | - written examination | 60%                          |
| 3   | 1,2,3,4          | - assignment          | 30%                          |

### Grading Criteria

|        |    |
|--------|----|
| 80-100 | A  |
| 70-79  | B+ |
| 60-69  | B  |

### Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

## Course Syllabus

**SCAN607 Advanced Microscopy and Structural Biology**

Institution Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

**Section 1 Overview**

1. **Course title and code** SCAN607 Advanced Microscopy and Structural Biology
2. **Credits** 2 (1-2-5) Credits (lecture - practice - self-study).
3. **Course Type**  
Elective course.
4. **Course coordinator**
  - 4.1 Course coordinator
    1. Assoc.Prof. Dr. Wattana Weerachatanukul
5. **Semester / Year of study.**  
Semester 2nd year
6. **Pre-requisite course.** SCID 507 Microscopic Techniques or equivalent course
7. **Co-requisite course:** none
8. **Place** Department of Anatomy
9. **Last update.** August 10th 2558

**Section 2: Aim of Course.****1. The aim of the course**

The course provides knowledge and skills involving

1.1 preparation of hydrated tissues for being studied by laser scanning confocal microscopy (LSCM), and the potential probes that are applicable for studying cellular dynamics in living cells and processed tissues;

1.2 molecular dynamics in the living cells and utilize the LSCM-relevant techniques, eg, FRAP, FLIP, FRET and TIRFM on cultured cells or membrane models;

1.3 methods and the underlying principles of antigen or mRNA localization and perform immunohistochemical staining and in situ hybridization in the hydrated tissues;

1.4 methods used to prepare cells for cryotransmission electron microscopy (cryoTEM) and electron tomography (ET), ie, rapid freezing, high pressure freezing, and freeze substitution.

1.5 the processes of three-dimensional image construction using LSCM and TEM tomography.

1.6 the principle underlying AFM and its application (s) for biological

**Section 3 Course Description****1. Description**

Modern techniques used in imaging the detailed structural organization of biological specimens in obtaining knowledge and understanding of the structure at macromolecules, cellular and tissue levels, computerized 3-D imaging using cryo-electron microscopy and electron tomography, confocal laser scanning microscopy; dynamic movement of macromolecules on the living cell surface and in cytoplasm by

FRAP, FLIP, FRET, immuno-fluorescence and immune-electron microscopic techniques.

### Section 4: Course Learning Outcomes

At the end of the course, the student will be able to:

- CLO 1:** Prepare hydrated tissues for being studied by laser scanning confocal microscopy (LSCM), and list the potential probes that are applicable for studying cellular dynamics in living cells and processed tissues **(ELO2,3,5,7)**
- CLO 2:** Explain molecular dynamics in the living cells and utilize the LSCM-relevant techniques, e.g., FRAP, FLIP, FRET and TIRFM on cultured cells or membrane models **(ELO2,3,5,7)**
- CLO 3:** Describe the methods and the underlying principles of antigen or mRNA localization and perform immunohistochemical staining and in situ hybridization in the hydrated tissues **(ELO2,3,5,7)**
- CLO 4:** Explain methods used to prepared cells for cryotransmission electron microscopy (cryoTEM) and electron tomography (ET), i.e., rapid freezing, high pressure freezing, and freeze substitution **(ELO2,3,5,7)**
- CLO 5:** Carry out the processes of three-dimensional image construction using LSCM and TEM tomography **(ELO2,3,5,7)**
- CLO 6:** Explain the principle underlying AFM and its application(s) for biological samples **(ELO2,3,5,7)**

### Section 5: Teaching and Assessment

#### 1. Plan

|   | Content   | CLO no.        | T/L approach   | Assessment Scheme   |
|---|---|----------------|--|---|
| 1 | Overview of advanced microscopy<br>Modern structural biology: dynamics and resolution count | <b>1,2,4,6</b> | Lecture using Powerpoint; lecture handout; Discussion; Suggested textbook and atlas      | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of assignment, presentation<br>-Evaluation on class participation |
| 2 | Cryosectioning  | <b>1,2</b>     | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation                 |
| 3 | Knowing antibody and antibody applications in life science                                  | <b>1,2</b>     | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation                 |
| 4 | Immunohistochemistry: Enzyme- and fluorescent- based methods                                | <b>3</b>       | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation                 |

|    | <b>Content</b>  | <b>CLO no.</b> | <b>T/L approach</b>  | <b>Assessment Scheme</b>  |
|----|---|----------------|--|---|
|    |   |                |  | participation   |
| 5  | Confocal microscopy, FRAP, FLIP, FRET   | <b>1,2,5</b>   | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation   |
| 6  | Atomic force microscopy and its application in biological science<br>AFM and its applications | <b>6</b>       | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation   |
| 7  | Total Internal Reflection Fluorescence Microscopy (TIRFM)                                     | <b>2</b>       | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation   |
| 8  | Tomography and Cryo-EM  | <b>4</b>       | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation   |
| 9  | Qualitative analysis of mRNA in the tissues   | <b>3</b>       | Lecture using Powerpoint; lecture handout; Discussion; Self-study; Conference; Practises | -Formative assessment<br>-Written exam (Summative)<br>-Evaluation of practise<br>-Evaluation on class participation   |
| 10 | Seminar & lab discussion  | <b>1-6</b>     | Oral prsentation; Group discussion;  | -Formative assessment<br>-Evaluation of practise<br>-Evaluation of presentation<br>-Evaluation on class participation |

## 2. Evaluation plan

| No. | Learning Outcome | Assessment methods     | The proportion of evaluation |
|-----|------------------|------------------------|------------------------------|
| 1   | 1,2,3,4,5,6      | Written examination    | 80%                          |
| 2   | 1,2,3,4,5,6      | Class attention        | 10%                          |
| 3   | 1,5              | Evaluation of practice | 20%                          |

## Appeal Procedure

If students have any appeals regarding assessments or grades, they can immediately ask the instructor and / or course coordinator by contacting them directly by phone or email.

**THESIS**

Course Syllabus

**SCAN699 Dissertation****SCAN799 Dissertation****SCAN898 Dissertation**

Name of Institute Mahidol University  
 Faculty / Department Faculty of Science Department of Anatomy

**Section 1 Overview**

- 1. Course title and code** SCAN699 Dissertation  
 SCAN799 Dissertation  
 SCAN898 Dissertation
- 2. Credits** SCAN699 Dissertation 36(0-108-0)  
 SCAN799 Dissertation 48(0-144-0)  
 SCAN898 Dissertation 48(0-144-0)
- 3. Course type**  
 Dissertation
- 4. Course Coordinator**  
 4.1 Course coordinator  
 1. Assoc. Prof. Dr. Permphan Dharmasaroja
- 5. Semester / Year of study.**  
 SCAN699 Dissertation First and second semesters / Year 2,3  
 SCAN799 Dissertation First and second semesters / Year 2,3,4  
 SCAN898 Dissertation First and second semesters / Year 1,2,3
- 6. Pre-requisite courses.** All required courses
- 7. Co-requisite courses.** none
- 8. Place** Department of Anatomy
- 9. Last update.** July 28, 2560

**Section 2: Aims of Course.****1. Aims of Course**

The course provides knowledge and skills involving

- 1.1 design of original research proposal
- 1.2 conducting research with concern of research ethics.
- 1.3 analysis of the result and report the result in terms of thesis.
- 1.4 presenting and publishing research
- 1.5 researcher professional ethics

**Section 3 Course Description****1. Description**

Designing an original research proposal related to anatomy and structural biology, conducting research concerning the research ethics, data collection, analysis, interpretation of the result, report the results in terms of thesis. Presenting and publishing research in international peer-reviewed journals

## Section 4: Course Learning Outcomes

At the end of the course, the student will be able to:

- CLO 1:** Design an original research proposal related to anatomy and structural biology with regard to ethical standards (ELO1,2)
- CLO 2:** Conduct research concerning the research ethics (ELO1,3,4)
- CLO 3:** Use and apply research equipment in relevance with the research project (ELO1,3,4)
- CLO 4:** Collect reliable data and process with regard to statistic significance (ELO4,6)
- CLO 5:** Analyze, synthesize, and evaluate scientific results and problems in a systematic and theoretical context (ELO2,4,6)
- CLO 6:** Collaborate with other co-workers and possess a good relationship with colleagues, receive and process feedback (ELO5)
- CLO 7:** Possess desirable attributes of leadership and society membership in conduction of research (ELO5)
- CLO 8:** Report the results in the form of dissertation (ELO7)
- CLO 9:** Efficiently present research results in academic societies, and teach others based on scientific findings (ELO6,7)
- CLO 10:** Publish research findings in international peer-reviewed journals (ELO7)

## Section 5: Teaching and Assessment

### 1. Plan

|   | Content  | CLO no. | T/L approach   | Assessment Scheme   |
|---|--|---------|--|---|
| 1 | Exploring related literature;<br>Literature review;<br>Research ethics and plagiarism;                             | 1       | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Advice for attending workshops on research ethics and plagiarism | -Evaluation during discussion<br>-Report and dissertation evaluation<br>-Behavioral observation;<br>-Records of assignment<br>-Qualifying examination |
| 2 | Designing a research proposal;<br>Creation of research objectives and hypotheses, including its benefits           | 1,2     | Self-study;<br>Discussion;<br>Suggestion and comments;   | -Evaluation during discussion<br>-Report and proposal evaluation<br>-Behavioral observation;<br>-Records of assignment<br>-Qualifying examination     |
| 3 | Preparation of experimental tools and chemicals;<br>Practicing of using experimental equipment                     | 3       | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Hand-on practise   | -Report and proposal evaluation<br>-Observation of practise;<br>-Records of assignment  |
| 4 | Conduction of a preliminary research for the direction and feasibility of the project;<br>Good laboratory practise | 3,4,5   | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Hand-on practise;<br>Handbook of good laboratory practise        | -Report and proposal evaluation<br>-Observation of practise;<br>-Records of assignment  |

|    | <b>Content</b>  | <b>CLO no.</b> | <b>T/L approach</b>   | <b>Assessment Scheme</b>   |
|----|---|----------------|---|--|
| 5  | Writing a research proposal   | <b>8</b>       | Self-study;<br>Discussion;<br>Suggestion and comments;  | -Report and proposal evaluation<br>-Proposal examination   |
| 6  | Conduction of research to achieve the objectives and hypotheses set   | <b>3,4,5</b>   | Self-study;<br>Discussion;<br>Suggestion and comments;  | -Report evaluation<br>-Observation of practise;<br>-Records of assignment  |
| 7  | Research collaboration and development of leadership in scientific societies  | <b>6,7,9</b>   | Assignment;<br>Group meeting;   | -Behavioral observation;<br>-Peer evaluation   |
| 8  | Summary of research results;<br>Mathematic and statistic analysis of data;<br>Analyze, synthesize, and evaluate scientific results and problems | <b>4,5,8</b>   | Self-study;<br>Assignment;<br>Discussion;<br>Suggestion and comments;<br>Symposium presentation                             | -Report evaluation<br>-Observation of practise;<br>-Records of assignment<br>-Evaluation of symposium presentation |
| 9  | Reporting of the research progression   | <b>8,9</b>     | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Symposium presentation;<br>Progress report                        | -Report evaluation<br>-Observation of practise;<br>-Records of assignment<br>-Evaluation of symposium presentation |
| 10 | Writing the research reports for publication in international journals or presentations in academic conferences                                 | <b>8,9,10</b>  | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Manuscript writing;<br>Proceeding / abstract / poster preparation | -Evaluation of manuscript<br>-Evaluation of proceeding, abstract, and poster<br>-Evaluation of presentation        |
| 11 | Writing a dissertation and preparation for a dissertation defence   | <b>8,10</b>    | Self-study;<br>Discussion;<br>Suggestion and comments;<br>Dissertation writing;   | -Evaluation of dissertation<br>-Evaluation at dissertation defence   |

## 2. Evaluation plan.

| Events | Learning Outcome | Assessment methods  |
|--------|------------------|---|
| 1      | 1,2,3,4,5,8      | - progress report<br>- evaluation by advisors<br>- evaluation at symposium<br>- dissertation report and defense |
| 2      | 6,7,9            | - evaluation by advisors<br>- dissertation report and defense   |
| 3      | 10               | - paper accepted for publication  |

## Grading Criteria

Pass (decision of Dissertation Examination Committee)



**Appeal Procedure**

If students have any appeals regarding assessments or grades, they can immediately ask the advisors and / or Program Director by contacting them directly by phone or email.