

SCPA 610: Cellular Pathology
Academic Year 2018

Department of Pathobiology
Mahidol University

Course Syllabus

(Lecture-Lab-Self-study)

SCPA 610 Cellular Pathology

2(2-0-4)

Diseases or abnormal patterns caused by complicated factors, affecting to function, morphology or cellular structure; Mechanisms causing pathological changes based on theory and basic techniques in sciences

Session 1st Semester

Course Outline

Date	Time	Topic	Lecture & Discussion	Lecturer
Tue 14 Aug	10:00-12:00	Introduction (Syllabus, Objective & Examination)	ANJ	
		Introduction to cellular pathology	L1	ANJ
	13:30-15:30	Ischemic and hypoxic cell injury	L2	WJ
Thu 16 Aug	10:00-12:00	Pigments and tissue deposits under pathologic conditions	L3	NC
	13:30-15:30	Mechanisms of cell injury: Free radicals	L4	PS
Tue 21 Aug	10:00-12:00	Mechanisms of cell injury: Loss of calcium homeostasis	L5	ANJ
	13:30-15:30	Mechanisms of cell injury: Mitochondrial damage and ATP depletion	L6	PC
Thu 23 Aug	10:00-12:00	Mechanisms of cell injury: Defect in membrane permeability	L7	NK
	13:30-15:30	Cellular Pathology from chemical and physical injuries	L8	WJ
Thu 30 Aug	10:00-12:00	Cellular Pathology of cancer	L9	PS
	13:30-15:30	Cellular Pathology of immunological disorder	L10	WP
Tue 4 Sep	9:00-12:00	Exam L1-L7		
Tue 11 Sep	10:00-12:00	Cellular Pathology of parasitic infection	L11	NK
	13:30-15:30	Cellular Pathology of fungal infection	L12	SN
Thu 13 Sep	10:00-12:00	Cellular Pathology of viral infection	L13	PC
	13:30-15:30	Cellular Pathology of bacterial infection	L14	YN
Tue 18 Sep	10:00-12:00	Cellular mechanisms of aging	L15	WP
Tue 2 Oct	9:00-12:00	Exam L8-L15		

Instructors

1. ANJ = Assistant Professor Dr.Amornrat Jensen
2. NC = Dr.Nisamanee Charoenchon
3. NK = Dr.Niwat Kangwanransan
4. PC = Dr.Pornthip Chaichompoo
5. PS = Associate Professor Dr.Prasit Suwannalert
6. SN = Somphong Narkpinit, M.D.
7. WJ = Associate Professor Dr.Wanee Jiraungkoorskul
8. WP = Dr.Witchuda Payuhakrit
9. YN = Dr.Yaowarin Nakornpakdee

Coordinator Assistant Professor Dr.Amornrat Naranuntarat Jensen
Department of Pathobiology, Faculty of Science, Mahidol University
Tel. 02-201-5579, E-mail: amornrat.nar@mahidol.ac.th

Leading Questions

These questions will be discussed during the first 15 minutes of the lecture in order to help providing background knowledge for a particular lecture.

L02 Ischemic and hypoxic cell injury

1. What is carbon monoxide poisoning?
2. Explain the sign and symptom from carbon monoxide poisoning

L03 Pigments and tissue deposits under pathologic conditions

1. How do pigments or biochemical deposit in our body?
2. What are pigments or biochemical depositions in tissue that you're familiar with? how?

L04 Mechanisms of cell injury: Free radicals

1. How oxidative stress induces cell injury?

L05 Mechanisms of cell injury: Loss of calcium homeostasis

1. Why is intracellular calcium important for the cell?
2. How does the cell regulate intracellular calcium levels?

L06 Mechanisms of cell injury: Mitochondrial damage and ATP depletion

1. What is the mechanism of cytochrome c release from mitochondria?
2. What is the function of cytochrome c in cytosol?
3. What kinds of cell injury and their mechanisms that leads to ATP depletion?

L07 Mechanisms of cell injury: Defect in membrane permeability

1. What are the importance of membrane permeability?
2. What are the causes of membrane injury?

L08 Cellular Pathology from chemical and physical injuries

1. Search the metal pollution crisis in the world only one case in these questions Where, When, What metal, How occurred?
2. Explain the sign and symptom from that metal toxic in question (1) especially the histopathology lesion.

L09 Cellular Pathology of cancer

1. What is an association between cellular biology and cancer process?

L10 Cellular Pathology of immunological disorder

1. How immune cells response to foreign antigen?
2. How immune system cause tissue injury?

L11 Cellular Pathology of parasitic infection

1. How can we get parasite infection?
2. How can we explain about host & parasite interaction?

L12 Cellular Pathology of fungal infection

30-years male HIV patient come to hospital with thick white curd patch on his tongue.

1. Explain the pathogenesis in this patient
2. Explain host defense mechanism in this patient

L13 Cellular Pathology of viral infection

1. What is pathogenesis of dengue hemorrhagic fever?
2. What are the mechanisms of evasion of host immune system by viral pathogens?

L14 Cellular Pathology of bacterial infection

Bacteria use a variety of toxins to attack their host on a cellular level

1. What is endotoxin?
2. Name at least two subgroups of exotoxins

L15 Cellular mechanisms of aging

1. What is the cellular aging?
2. What factors that induced cellular aging?

Lesson Plan

1. Topic	L01-Introduction to cellular pathology
2. Name Lecturer	Amornrat Jensen
Education	Ph.D. (Toxicology)
Position	Lecturer
Contact	02-201-5579, Email: amornrat.nar@mahidol.ac.th
3. Course	Cellular Pathology I (SCPA 610)
4. Program Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	14 August 2018, 10:00-12:00 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain how the cells response to stress and injurious stimuli 2. Describe different types of cellular adaptation to stress insults 3. Explain the causes and types of cell injury and cell death
7. Topic Details	
	<ol style="list-style-type: none"> 1. Cellular response to stress and injurious stimuli 2. Cellular adaptation 3. Cell injury and cell death 4. Overview of biochemical mechanisms of cell injury
8. Learning Methods	Lecture, Group Discussion and Self study
9. Teaching Media	Power point presentation, Handout, Text books
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Class participation and written examination
12. Date of Improvement	26 July 2018

Lesson Plan

1. Topic	L02-Ischemic and hypoxic cell injury
2. Name Lecturer	Dr. Wannee Jiraungkoorskul
Education	PhD
Position	Associate Professor
Contact	201-5571, wannee.jir@mahidol.ac.th
3. Course	Cellular Pathology (SCPA 610)
4. Program Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	14 August 2018, 1:30-3:30 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain the definition and course of ischemic and hypoxic cell injury 2. Explain the cellular and ultrastructure changes due to ischemia and hypoxia 3. Discuss the literature reviews on cellular effects from ischemia and hypoxia
7. Topic Detail	
	Definition and course of ischemic and hypoxic cell injury, Ultrastructure changes, literature reviews on cellular effects from ischemia and hypoxia
8. Learning Methods	Lecture, Discussion and Self study
9. Teaching Media	Handout, Text book, and CAI
10. Teaching Equipment	Computer, LCD, Microscope
11. Examination and Evaluation	Short answer
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L03-Pigment and tissue deposits under pathologic conditions
2. Name Lecturer	Dr. Nisamanee Charoenchon
Education	Ph.D. (Medicine)
Position	Lecturer
Contact	02-201-5573, Email:nisamanee.cha@mahidol.ac.th
3. Course	Cellular Pathology (SCPA 610)
4. ProgramTitle	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	16 August 2018, 10.00-12.00 AM
6. Topic Objective	At the completion of this unit the student will be able to <ol style="list-style-type: none"> 1. Specify pigments and tissue deposits, i.e., melanin, lipid, glycogen and protein under normal and pathological condition in cells or tissue 2. Describe the mechanism of pigments and tissue deposits
7. Topic Detail	<ol style="list-style-type: none"> 1. Various types of pigments and tissue deposits, i.e., melanin, lipid, glycogen and protein under normal and pathological condition 2. The pathogenesis of common disease related pigments and tissue deposits 3. The mechanism of pigments and tissue deposits
8. Learning Methods	Lecture, Laboratory, Group discussion and Self study
9. Teaching Media	PPT, Handout, Text book, Gross specimens and Glass slides of histopathology
10. Teaching Equipment	Computer, LCD, Microscope
11. Examination and Evaluation	In-class participation, written examination
12. Date of Improvement	30 July 2018

Lesson Plan

1. Topic	L04-Mechanisms of cell injury: Free radicals
2. Name Lecturer	Dr. Prasit Suwannalert
Education	Ph.D. (Pathobiology)
Position	Associate Professor
Contact	02-201-5558, prasit.suw@mahidol.ac.th
3. Course	Cellular Pathology (SCPA 610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	16 August 2018, 1.30-3.30 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe basic concepts of free radicals and anti-oxidants 2. Discuss the association between oxidative stress and cell injury
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Free radicals: ROS, RNS 2. Oxidative stress and cell injury 3. Anti-oxidants
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	Mechanisms of cell injury: Loss of calcium homeostasis
2. Name Lecturer	Amornrat Jensen
Education	Ph.D.
Position	Lecturer
Contact	Email: amornrat.nar@mahidol.ac.th
3. Course	Cellular pathology I (SCPA 610)
4. Program Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	21 August 2018, 10:00-12:00 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain the important of intracellular calcium homeostasis maintenance 2. Describe cellular mechanisms of calcium homeostasis maintenance 3. Describe impacts from disruption in calcium homeostasis on pathology of the cells
7. Topic Detail	
	<ol style="list-style-type: none"> 1. The role of intracellular calcium and significance of calcium homeostasis 2. Cellular pathways involved in maintaining intracellular calcium 3. Cellular pathology from disruption in calcium homeostasis control
8. Learning Methods	Lecture and discussion
9. Teaching Media	PowerPoint presentation, Handout, Review articles
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Class participation and written examination
12. Date of Improvement	26 July 2018

Lesson Plan

1. Topic	L06-Mechanisms of cell injury: Mitochondrial damage and ATP depletion
2. Name Lecturer	Pornthip Chaichompoo
Education	Ph.D. (Immunology)
Position	Lecturer
Contact	Email: pornthip.chh@mahidol.ac.th
3. Course	SCPA610 Cellular pathology 2(2-0-4)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	August 21, 2018 at 1:30 – 3:30 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe the mechanisms of ATP synthesis 2. Describe structure and functions of mitochondria. 3. Describe the mechanisms of mitochondrial damage and ATP depletion. 4. Analyze the effects of mitochondrial damage and ATP depletion on cellular pathogenesis.
7. Topic Detail	
	<ol style="list-style-type: none"> 1. ATP synthesis via glycolysis, pentose phosphate pathway and electron transport chain. 2. Structure and functions of mitochondria. 3. Program cell death: necrosis, apoptosis and autophagy pathways 4. The mechanism of mitochondrial damage and cellular response. 5. The mechanism of cellular pathogenesis of mitochondrial damage and ATP depletion.
8. Learning Methods	Group discussion, Lecture
9. Teaching Media	Power point presentation, Original article, Handout and Text book
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Assay Examination
12. Date of Improvement	July 30, 2018

Lesson Plan

1. Topic	L07-Defect in membrane permeability
2. Name Lecturer	Niwat Kangwanrangsak
Education	Ph.D. (Medical Sciences)
Position	Lecturer
Contact	02-201-5576, Email: niwat.kan@mahidol.ac.th
3. Course	Cellular Pathology I (SCPA 610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	23 August 2018, 10.00-12.00 AM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Understand the structure and function of cell membrane 2. Explain the processes of defect in membrane permeability associated with cell injury 3. Explain the biochemical mechanisms and cellular processes of membrane damage
7. Topic Details	
	<ol style="list-style-type: none"> 1. Background on structure and function of cell membrane and its permeability 2. Membrane permeability related with cell injury 3. Biochemical mechanisms involved in membrane damage 4. Defect in cell membrane 5. Defect in organelle membrane
8. Learning Methods	Lecture, Group discussion
9. Teaching Media	Power point presentation, Handout, Text books, Publications
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Class participation and written examination
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L09-Cellular pathology from chemical and physical injuries
2. Name Lecturer	Dr. Wannee Jiraungkoorskul
Education	PhD
Position	Associate Professor
Contact	201-5571, wannee.jir@mahidol.ac.th
3. Course	Cellular Pathology (SCPA 610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	23 August 2018, 1:30-3:30 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Explain the pathogenesis and histopathological changes due to chemical and physical agents 2. Explain the cellular effects of heavy metals 3. Discuss the literature reviews on cellular effects of heavy metals
7. Topic Detail	
	Heavy metals have been contaminated in the environment and have many effects on health. The mechanism, pathogenesis, and cellular pathological changes are continuing studied and reported.
8. Learning Methods	Lecture, Discussion and Self study
9. Teaching Media	Handout, Text book, and CAI
10. Teaching Equipment	Computer, LCD, Microscope
11. Examination and Evaluation	Short answer
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L10- Cellular pathology of cancer
2. Name Lecturer	Dr. Prasit Suwannalert
Education	Ph.D. (Pathobiology)
Position	Associate Professor
Contact	02-201-5558, Email: prasit.suw@mahidol.ac.th
3. Course	Cellular Pathology (SCPA 610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	30 August 2018, 1.30-3.30 PM
6. Topic Objective	At the completion of this unit, the students will be able to
	<ol style="list-style-type: none"> 1. Describe an association of cellular biology and cancer process 2. Discuss the cellular changes in cancer development and progression
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Regulation of cell division, differentiation, and apoptosis in cancer process 2. Cellular pathology of cancer development and progression
8. Learning Methods	Lecture, Discussion, and Self study
9. Teaching Media	PPT, Handout, Text book, Research article
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Short answer questions, Class participation
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L11-Cellular Pathology of parasitic infection
2. Name Lecturer	Niwat Kangwanrangsana
Education	Ph.D. (Medical Sciences)
Position	Lecturer
Contact	02-201-5576, Email: niwat.kan@mahidol.ac.th
3. Course	Cellular Pathology I (SCPA 610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	11 September 2018, 10.00-12.00 AM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Understand the biology of parasite infection 2. Explain the process and pathology of parasitic infection including protozoa, helminth, and ecto-parasite 3. Explain the cellular responses to pathogenic parasite infection
7. Topic Details	
	<ol style="list-style-type: none"> 1. Introduction to parasitic infection 2. Classification of pathogenic parasites 3. Cell and tissue damage from parasitic infection 4. Infection by protozoan parasites 5. Infection by helminthic parasites 6. Cellular response to parasitic infection
8. Learning Methods	Lecture, Group discussion
9. Teaching Media	Power point presentation, Handout, Text books, Publications
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Class participation and written examination
12. Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L12-Cellular pathology of fungal infection
2. Name Lecturer	Somphong Narkpinit
Education	M.D.
Position	Lecturer
Contact	Email: somphong.nar@mahidol.ac.th
3. Course	SCPA610 Cellular pathology 2(2-0-4)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	September 11, 2018, 1:30-3:30 PM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Describe morphology and characteristics of fungal cell 2. Describe the host changes in fungal infection 3. Identify signal transduction pathway involve hyphal growth
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Types of fungal infection 2. Role of morphology in fungal disease 3. <i>Candida albican</i> 4. <i>Blastomyces dermatitidis</i> 5. <i>Cryptococcal neoforman</i>
8. Learning Methods	Lecture, Presentation, Group discussion
9. Teaching Media	Power point presentation, Handout, Text book
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Assay Examination
12. Date of Improvement	July 2018

Lesson Plan

1. Topic	L13-Cellular pathology of viral infection
2. Name Lecturer	Pornthip Chaichompoo
Education	Ph.D. (Immunology)
Position	Lecturer
Contact	Email: pornthip.chh@mahidol.ac.th
3. Course	SCPA610 Cellular pathology 2(2-0-4)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	September 13, 2018, 10:00 – 12:00 AM
6. Topic Objective	At the completion of this unit the student will be able to
	<ol style="list-style-type: none"> 1. Classification of virus by Baltimore system 2. Describe mechanisms of viral infection and host immune response 3. Analyze pathogenesis that occur from each type of virus
7. Topic Detail	
	<ol style="list-style-type: none"> 1. Classification of virus by Baltimore system 2. Mechanisms of viral infection and host immune response 3. Pathogenesis of virus in each group
8. Learning Methods	Lecture, Presentation, Group discussion
9. Teaching Media	Power point presentation, Handout, Text book
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Assay Examination
12. Date of Improvement	July 30, 2018

Lesson Plan

1.Topic	L14-Cellular Pathology of Bacterial Infection
2.Name Lecturer	Dr. Yaowarin Nakornpakdee
Education	Ph.D. (Medical Microbiology)
Position	Lecturer
Contact	02-201-5578, Email: yaowarin-arin@hotmail.com
3.Course	Cellular Pathology (SCPA610)
4.Programme Title	M.Sc. and Ph.D. in Pathobiology
5.Dateand Time	13 September 2018, Time 1:30-3:30 pm
6.Topic Objective	At the completion of this unit the student will be able to
Understand classical mechanisms of cellular pathology in bacterial infection.	
7.Topic Detail	
Mechanisms of cell damage by bacterial toxins as well as cellular injuries inflicted by misguided host immune response will be explained.	
8.Learning Methods	Lecture, Discussion
9.Teaching Media	Handout and presentation
10.Teaching Equipment	Computer, LCD
11.Examinationand Evaluation	Short answer questions
12.Date of Improvement	29 July 2018

Lesson Plan

1. Topic	L15-Cellular mechanisms of aging
2. Name Lecturer	Witchuda Payuhakrit
Education	Ph.D. (Pathobiology)
Position	Lecturer
Contact	02-201-5572, Email: witchuda.pay@mahidol.ac.th
3. Course	Cellular Pathology (SCPA610)
4. Programme Title	M.Sc. and Ph.D. in Pathobiology
5. Date and Time	18 September 2018 (10:00-12:00 Am.)
6. Topic Objective	At the completion of this unit the student will be
<ol style="list-style-type: none"> 1. Understand the hallmarks of aging 2. Describe the molecular mechanism aging 3. Describe the pathogenesis of common diseases associated aging 	
7. Topic Details	
<ol style="list-style-type: none"> 1. Hallmarks of aging 2. Cellular senescence 3. Aging related tissue injury 	
8. Learning Methods	Lecture, Presentation, Group discussion
9. Teaching Media	Power point presentation, Handout, Text books, Publications
10. Teaching Equipment	Computer, LCD
11. Examination and Evaluation	Written examination
12. Date of Improvement	25 July 2018