



Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title:** KACB 209 Genetics
Credit (study hours): (3-0-6)
2. **Program Name:** Bachelor of Science in Conservation Biology
3. **Course Module:** Gen.Edu. course B.Sc. core course CB core course Elective course
- Pre/co-requisite:** SCBI 124, SCBI 102
4. **Semester:** 1stsemester 2ndsemester 3rdsemester **Academic Year 2021**
5. **Class Schedule & Venue:** Friday 13:00-16:00
6. **Course Coordinator:** Lect. Sanae Jitklang
Tel. 085-1427395, Email: sanae.jit@mahidol.ac.th

7. Course Description

Introduction to Genetics; Reproduction and cell cycle; Mendelian genetics; Extensions of Mendelian genetics; Quantitative genetics; Extranuclear inheritance; Chromosome mapping; Sex determination; Cytogenetics and chromosomal variation; Human genetics and pedigree analysis; Basic of Molecular genetics, DNA Replication and the central dogma; Application of genetic engineering; Population genetics; Species concepts and speciation; Conservation genetics

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives/CLOs	PLOs*
8.1	Define genetic terms, introduction to reproduction and cell cycle	1
8.2	Compare the concept between mendelian and non-mendelian genetics	1
8.3	Explain the chromosome mapping, cytogenetics, sex determination and chromosomal variation including human genetics	1
8.4	Explain the concepts of molecular genetics, population genetics, species concept and the concepts of conservation genetics for applying in biodiversity conservation	2,4

NOTE: *PLOs = Program Learning Outcomes

PLO 1: Apply skills and knowledge of fundamental and biological sciences for explaining biodiversity.

PLO 2: Evaluate functions, value, status, trend, and threats to address biodiversity problems.

PLO 4: Choose appropriate techniques, research, and possible practices for biodiversity conservation.

9. Class Instructor

Name : Sanae Jitklang

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10. Course Outline

Week	Date	Contents	CLOs	Instructor's Names
1	23/07/21	Course overview and Introduction to genetics - Three great milestones in Genetics (Mendel, Watson and Crick, Genome Project) - Introduction to heredity	1	Sanae Jitklang
2	30/07/21	Reproduction and cell cycle - Difference between asexual and sexual reproduction - Similarity and difference between mitosis and meiosis - The role of meiosis in sexual life cycles	1	Sanae Jitklang
3	6/08/21	Mendelian genetics - Mendelian genetics: experiment of genetic cross - Law of segregation gene and independent assortment - Application of Mendelism: Punnet square and branching system	1,2	Sanae Jitklang
4	13/08/21	Extensions of Mendelian genetics - Incomplete dominance, co-dominance - Pleiotropy, Epistasis, Complementary gene, Modifier gene, Lethal gene, Sub-lethal gene	1,2	Sanae Jitklang
5	20/08/21	Quantitative genetics (Polygenic inheritance) - Difference between Qualitative genetics and Quantitative genetics (Polygenic inheritance) including heritability	1,2	Sanae Jitklang
6	27/08/21	Extranuclear inheritance - Cytoplasmic inheritance; Chloroplast DNA and Mitochondrial DNA - Mitochondrial inheritance and Endosymbiosis theory - Maternal effect	1,2	Sanae Jitklang
7	03/09/21	Chromosome mapping - Linked gene and linkage group - Sturtevant and Morgan's discoveries: sex-linked gene - Calculating the distance between gene; crossing over and recombination frequency	1,3	Sanae Jitklang

8	10/09/21	Sex chromosome and Sex determination - Classification of Sex determination system in group of organism - Sex determination in Human, Karyotype, Human Y Chromosome and Barr bodies - Environmental sex determination: Temperature dependent sex determination in Reptiles	1,3	Sanae Jitklang
9	Mid-term Examination 18/09/21-8/10/21			
10	17/09/21	Cytogenetics, Variation in chromosomes - Definition of cytogenetics - Polytene chromosome and structure - Variation in chromosome number and structure	1,3	Sanae Jitklang
11	24/09/21	Human genetics and Pedigree analysis - Important role in genetic counseling and pedigree symbol for inherited diseases - Autosomal recessive or dominant inheritance - X-linked recessive or dominant inheritance - Y-linked inheritance	1,3	Sanae Jitklang
12	01/10/21	Molecular genetics - Structure of DNA and RNA - The Central Dogma: transcription and translation	1,4	Sanae Jitklang
13	15/10/21	Genetic engineering - Application of molecular genetics; Genetic engineering	1,4	Sanae Jitklang
14	22/10/21	Population genetics - Calculating gene and genotype frequency - Hardy-Weinberg Law and factors that change the gene frequency	1,4	Sanae Jitklang
15	29/10/21	Species concept and Speciation - Species problems, species concepts and biological species concepts including reproductive isolating mechanism	1,4	Sanae Jitklang
16	05/11/21	Conservation genetics - Definition of conservation genetics	1,4	Sanae Jitklang

		- Habitat and population fragmentation - Loss of genetic diversity in small population		
17	Final Examination 12-19-26/11/21			

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	3 hours exam (other regulations will be announced in the class later)	1, 2, 3, 4	1-8	35
11.2	Final exam	3 hours exam (other regulations will be announced in the class later)	1, 4, 5	10-16	35
11.3	Assignments/quiz	To be announced	1-5	1-8, 10-16	15
11.4	Reports and discussion	To be announced	5	16	5
11.5	Class attendance and participation	On time class	1-5	1-8, 10-16	10
				Total	100

12. Grading System

Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	≥ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

Norm-referenced evaluation

*If use both criterion and norm-referenced evaluation, please tick two boxes.

13. References

Snustad D.P. and Simmons M.J. (2012). *Principles of Genetics*. 6th edition, John Wiley and Sons. 786 pp.

Tamarin R. H. (2001). *Principles of Genetics*. 7th edition, The McGraw-Hill Companies. 686 pp.