**PAMANTASAN NG LUNSOD NG VALENZUELA**

**COURSE SYLLABUS**

**GENETICS AND BIOTECHNOLOGY**

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| **Course Title:** | Genetics and Biotechnology |
| **Course No.** | Gen |
| **School Year & Semester** | S.Y. 2012 – 2013 / Second Semester |
| **Faculty** | Mr. Jaime S. De Vera, Jr. |
| **Department:** | Science  |
| **College** | Education |
| **Course Prerequisites** | General Biology (NatSci 2) |
| **Course Description** | The purpose of this course is to provide an in-depth, background in major areas of application of biotechnology, classical genetics, molecular genetics and population genetics. Students will learn the fundamentals of genetics particularly about the transmission, distribution, arrangement, and alteration of genetic information. As combined course, the students will also develop knowledge in biotechnology specifically on techniques and applications used in agriculture, commercial manufacturing, consumer products and medicine. The course will lead the students to an improved understanding of current genetics topics and applications of biotechnology with their influence on modern life, and provides a foundation for more advanced studies in human, animal, and plant biology and related fields.  |
| **Course Objectives** | At the end of the course, the students should be able to:* Understand and apply the principles of genetics through problem-based approach.
* Perform empirical experiments through the learned concepts in genetics and biotechnology.
* Appreciate the wonders of biotechnology and creative ways in which scientists can use nature to improve human lives.
* Develop ethical and moral decisions as to the use of biotechnology.
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| **Course Format** | Socratic dialogue, forum, deductive method, inductive method, comparative analysis, small-group discussion, educational trips, quizzes, graded recitations, seat-works, assignments, midterm examinations and final examinations. |
| **Course Content** | 1. **Introduction of the Course**
2. Orientation
3. Overview of the study of heredity & variation
4. **Genes, Chromosomes and Heredity**
5. Mitosis and Meiosis
6. Mendelian Genetics
7. Extensions of Mendelian Genetics
8. Chromosome mapping in eukaryotes
9. Genetic analysis and mapping in bacteria and bacteriophages
10. Sex determination and sex chromosomes
11. Chromosome mutations: variation in number and arrangement
12. Extranuclear inheritance
13. **DNA: Structure, Replication and Variation**
14. DNA structure
15. DNA replication and recombination
16. DNA organization in chromosomes
17. Genetic code and transcription
18. Translation and proteins
19. Gene mutation, DNA repair and transposition
20. Regulation of gene expression in prokaryotes
21. Regulation of gene expression in eukaryotes
22. Developmental genetics
23. Cancer and regulation of the cell cycle
24. **Genomics**
25. Recombinant DNA technology
26. Genomics, bioinformatics and proteomics
27. Genetics of organisms and population
28. Genetics behavior
29. Population and evolutionary genetics
30. Conservation genetics
31. **Biotechnology**
32. Definition of biotechnology
33. Basic science of biotechnology
34. Tools of biotechnology
35. Biotechnology Innovations
36. Principal People of Biotechnology
37. Applications and ethics of biotechnology
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| **Course References** | * Klug W., et.al. Concepts of Genetics, 10th Edition. Pearson Education Inc. 2009.
* Robert H. Tamarin. Principles of Genetics, 7th Ed. The McGraw-Hill Companies. 2001.
* Pierce B. Genetics: A Conceptual Approach. McGraw-Hill Companies, U.S.A. 2001
* G. Walsh (Ed.) Proteins: Biochemistry and Biotechnology. John Willey and Sons, Ltd. West Sussex, England 2002.
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| **Additional Materials** | selected articles, clippings and video clips |
| **Course Requirements & Grading** | A student should be able to:1. pass the major examinations and quizzes
2. participate in the classroom discussion and laboratory activities
3. submit a course project and other necessary requirements

**Grading System*** Quizzes 20%
* Midterm / Final Examination 40%
* Classroom Participation / Project Report 20%
* Worksheets, Portfolio, Journal etc. 10%
* Attendance / Attitude 10%

 100%Midterm + Final Term = **Final Grade** 2 |
| **Course Calendar** |
| **Week 1** | * Classroom orientation
* Introduction to the study of genetics
* Structure and types of chromosomes
* Mitosis and meiosis
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| **Week 2** | * Mendelian genetics
* Monohybrid cross
* Dihybrid cross
* Problems and Discussion Questions of Mendelian genetics
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| **Week 3** | * Extension of Mendelian genetics
* Incomplete dominance
* Codominance
* Multiple alleles
* Lethal alles
* Epistasis
* Sex-linked traits
* Sex-limited traits
* Sex-influenced traits
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| **Week 4** | * Chromosomes mapping in eukaryotes
* Genetic analysis and mapping in bacteria
* Genetic analysis and mapping in bacteriophages
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| **Week 5** | * Sex determination and sex chromosomes
* Chromosome mutations: variation in number and arrangement
* Extranuclear inheritance
 |
| **Week 6**  | * DNA structure
* DNA replication and recombination
* DNA organization in chromosomes
* Genetic code and transcription
* Translation and proteins
 |
| **Week 7** | Midterm Examination |
| **Week 8** | * Gene mutation, DNA repair and transposition
* Regulation of gene expression in prokaryotes
* Regulation of gene expression in eukaryotes
* Developmental genetics
* Cancer and regulation of the cell cycle
 |
| **Week 9** | * Recombinant DNA technology
* Genomics, bioinformatics and proteomics
* Genetics of organisms and population
 |
| **Week 10** | * Genetics behavior
* Population and evolutionary genetics
* Conservation genetics
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| **Week 11** | * Definition of biotechnology
* Basic science of biotechnology
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| **Week 12** | * Tools of biotechnology
* Biotechnology Innovations
* Principal People of Biotechnology
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| **Week 13** | * Applications and ethics of biotechnology
* Genetically modified organisms (GMO)
* Gene therapy
* Stem cell research
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| **Week 14** | * Tissue engineering
* Xenotransplantation
* DNA finger printing
* Presentation of project
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| **Week 15** |  Final Examination |

**Supplementary Materials:** Multimedia Equipment (laptop and LCD projector, laboratory activities / manual, Science Journals)

 Prepared by:

 **JAIME S. DE VERA, JR.**

 Instructor