

**Course Structure for M.A. Program**  
**Cellular and Molecular, Department of Life Science**  
**National Taiwan Normal University**

| Adaptive to Class of | Required Credit(s) | Elective Credit(s) | Free Elective Credit(s) | Minimum Total Credits for Graduation |
|----------------------|--------------------|--------------------|-------------------------|--------------------------------------|
| 113                  | 9.0                | 15.0               | 0.0                     | 24.0                                 |

Note: The first alphabet "E" on the course name refers to the course in English as a medium of instruction

**I. Required Courses: 0.0 credit is required**

**II. Elective Courses: 0.0 credit is required**

**III. Courses Offered to Students in Different Divisions**

Required Course, 9.0 credits are required

| Course Code | Course Name                                | Credit(s) | Credit Unit  |                   | Note  |
|-------------|--|-----------|--------------|-------------------|---|
|             |  |           | Lecture Hour | Lab/Practice Hour |   |
| BIC0138     | 1 Cellular and Molecular Biology           | 3.0       | 3.0          | 0.0               |   |
| BIC8007     | 2 Research Methods of Experimental Biology | 2.0       | 2.0          | 0.0               |   |
| BIM0123     | 3 Seminar                                  | 2.0       | 2.0          | 0.0               | This course must be retaken with a passing score for 2 times<br>Group in Cellular and Molecular Students must choose this course four times, but it just count two times credits. |

Elective Course: 15.0 credits are required

Students can choose to take up to 8 credits outside the school with the guidance of a professor.

| Course Code  | Course Name  | Credit(s) | Credit Unit  |                   | Note |
|--|--|-----------|--------------|-------------------|------|
|  |  |           | Lecture Hour | Lab/Practice Hour |      |
| <b>1 Core Elective Curriculum 2 courses are least required</b> |  |           |              |                   |      |
| BIC0123  | 1-1 Developmental Biology  | 3.0       | 3.0          | 0.0               |      |
| BIC9006  | 1-2 Stem Cell Biology  | 3.0       | 3.0          | 0.0               |      |
| BIC0139  | 1-3 Protein and Enzyme Chemistry                                     | 3.0       | 3.0          | 0.0               |      |
| BIC0177  | 1-4 Biotechnology  | 3.0       | 3.0          | 0.0               |      |
| BIC0001  | 1-5 Neurobiology   | 3.0       | 3.0          | 0.0               |      |
| BIC0133  | 1-6 Topics in Molecular Biology                                      | 2.0       | 2.0          | 0.0               |      |
| BIC9040  | 1-7 Signal Transduction  | 3.0       | 3.0          | 0.0               |      |
| BIC0006  | 2 Biological Geography   | 3.0       | 3.0          | 0.0               |      |
| BIC0084  | 3 Animal Behaviour   | 3.0       | 3.0          | 0.0               |      |
| BIC0085  | 4 Marine Biology   | 2.0       | 2.0          | 0.0               |      |
| BIC0086  | 5 Ornithology  | 3.0       | 3.0          | 0.0               |      |
| BIC0087  | 6 Herpetology  | 2.0       | 2.0          | 0.0               |      |
| BIC0088  | 7 Recreation Ecology   | 3.0       | 3.0          | 0.0               |      |
| BIC0108  | 8 Marine Ecology   | 2.0       | 2.0          | 0.0               |      |
| BIC0111  | 9 Respiratory and Circulatory Physiology                             | 2.0       | 2.0          | 0.0               |      |
| BIC0170  | 10 E Forest Ecology  | 3.0       | 3.0          | 0.0               |      |
| BIC0175  | 11 Biological Invasions  | 3.0       | 3.0          | 0.0               |      |
| BIC9008  | 12 E Landscape Ecology   | 3.0       | 3.0          | 0.0               |      |
| BIC9009  | 13 Plant Genetic Engineering   | 3.0       | 3.0          | 0.0               |      |
| BIC9011  | 14 Bioindustry   | 2.0       | 2.0          | 0.0               |      |
| BIC9013  | 15 Program Language in Bioinformatics                                | 3.0       | 3.0          | 0.0               |      |
| BIC9014  | 16 Algorithms in Bioinformatics                                      | 3.0       | 3.0          | 0.0               |      |
| BIC9015  | 17 Biological Microtechnique (including Lab.)                        | 3.0       | 2.0          | 2.0               |      |
| BIC9021  | 18 E Wildlife Biology  | 3.0       | 3.0          | 0.0               |      |
| BIC9024  | 19 Principles of Systematic Biology                                  | 3.0       | 3.0          | 0.0               |      |
| BIC9025  | 20 Island Biogeography   | 3.0       | 3.0          | 0.0               |      |
| BIC9027  | 21 Concept and Experimental Learning of Plant Factory                | 2.0       | 1.0          | 2.0               |      |
| BIC9028  | 22 Translational Application of Stem Cell                            | 1.0       | 1.0          | 0.0               |      |
| BIC9029  | 23 Translational Application of Stem Cell Experiment                 | 1.0       | 0.0          | 3.0               |      |
| BIC9030  | 24 Biodiesel Biotechnology   | 1.0       | 1.0          | 0.0               |      |
| BIC9031  | 25 Biodiesel Biotechnology Experiment                                | 1.0       | 0.0          | 3.0               |      |
| BIC9032  | 26 Cancer Biology  | 2.0       | 2.0          | 0.0               |      |
| BIC9033  | 27 Reactive Oxygen Species and Biological Medicine                   | 1.0       | 1.0          | 0.0               |      |
| BIC9034  | 28 Methods for Reactive Oxygen Species Measurement                   | 1.0       | 0.0          | 3.0               |      |
| BIC9035  | 29 Data Analysis for Ecology and Evolution in R Programming Language | 3.0       | 3.0          | 0.0               |      |
| BIC9036  | 30 Ecological Plant Physiology                                       | 3.0       | 3.0          | 0.0               |      |
| BIC9062  | 31 E Plant Cell and Tissue Culture                                   | 3.0       | 3.0          | 0.0               |      |
| BIC0016  | 32 E Topics in Plant Molecular Biology                               | 2.0       | 2.0          | 0.0               |      |
| BIC0017  | 33 Topics in Fish Physiology   | 3.0       | 3.0          | 0.0               |      |

| Course Code | Course Name  | Credit(s) | Credit Unit  |                   | Note |
|-------------|--|-----------|--------------|-------------------|------|
|             |  |           | Lecture Hour | Lab/Practice Hour |      |
| BIC0021     | 34 Topics in Molecular Genetics  | 3.0       | 3.0          | 0.0               |      |
| BIC0038     | 35 Studies in Adaptation and Natural Selection                                       | 2.0       | 2.0          | 0.0               |      |
| BIC0052     | 36 Neuropharmacology   | 3.0       | 3.0          | 0.0               |      |
| BIC0059     | 37 Architecture of Brain   | 3.0       | 3.0          | 0.0               |      |
| BIC0061     | 38 E Principles and Methods of Plant Taxonomy  | 3.0       | 3.0          | 0.0               |      |
| BIC9054     | 39 Ecophysiology   | 3.0       | 3.0          | 0.0               |      |
| BIC0101     | 40 Paper Writing and Presentation in Biological Science                              | 2.0       | 2.0          | 0.0               |      |
| BIC0153     | 41 Regression Analysis   | 3.0       | 3.0          | 0.0               |      |
| BIC0185     | 42 Adaptation and Natural Selection  | 3.0       | 3.0          | 0.0               |      |
| BIC0186     | 43 Protein Engineering   | 3.0       | 3.0          | 0.0               |      |
| BIC8003     | 44 Ecology and Evolution of Amphibians and Reptiles                                  | 2.0       | 2.0          | 0.0               |      |
| BIC8006     | 45 Topics on Animal Physiology (II)  | 2.0       | 2.0          | 0.0               |      |
| BIC8016     | 46 Writing Scientific Papers in English  | 3.0       | 3.0          | 0.0               |      |
| BIC8018     | 47 Topics on Animal Physiology (I)   | 2.0       | 2.0          | 0.0               |      |
| BIC8020     | 48 Biotechnology for the Drug Development  | 2.0       | 2.0          | 0.0               |      |
| BIC7001     | 49 Special Topics on Intellectual Property   | 2.0       | 2.0          | 0.0               |      |
| BIC7002     | 50 Industrial Practice   | 3.0       | 3.0          | 0.0               |      |
| BIC7004     | 51 Translational Medicine — Novel Compounds and Chinese Herbal Medicines             | 2.0       | 2.0          | 0.0               |      |
| BIC7005     | 52 E Drug Development and Translational Medicine                                     | 2.0       | 2.0          | 0.0               |      |
| BIC7009     | 53 Immunochemistry   | 3.0       | 3.0          | 0.0               |      |
| BIC7010     | 54 Neuroethology   | 3.0       | 3.0          | 0.0               |      |
| BIC0173     | 55 Evolutionary Biology  | 3.0       | 3.0          | 0.0               |      |
| BIC0174     | 56 E Advanced Ecology  | 3.0       | 3.0          | 0.0               |      |
| BIC7007     | 57 Population Genetics and Evolution   | 3.0       | 3.0          | 0.0               |      |
| BIC8010     | 58 Research Methods in Ecology and Evolution   | 1.0       | 1.0          | 0.0               |      |
| BIC0011     | 59 Experimental Design and Data Analysis   | 3.0       | 3.0          | 0.0               |      |
| BIC7012     | 60 Principles of Phylogenetics   | 3.0       | 3.0          | 0.0               |      |
| BIM0124     | 61 Modern Physiology   | 3.0       | 3.0          | 0.0               |      |
| BIC9022     | 62 Endocrinology   | 3.0       | 3.0          | 0.0               |      |
| BIC7015     | 63 Comparative Animal Physiology   | 3.0       | 3.0          | 0.0               |      |
| BIC0119     | 64 Learning and memory   | 3.0       | 3.0          | 0.0               |      |
| BIC8012     | 65 Oxidative Stress Physiology   | 3.0       | 3.0          | 0.0               |      |
| BIC8022     | 66 E Behavioral Ecology  | 3.0       | 3.0          | 0.0               |      |
| BIC8021     | 67 Experimental Physiology   | 2.0       | 2.0          | 0.0               |      |
| BIC9041     | 68 Environmental Physiology  | 3.0       | 3.0          | 0.0               |      |
| BIC9042     | 69 Transgenic  | 2.0       | 2.0          | 0.0               |      |
| BIC9045     | 70 Inquiry and Practice in Biology   | 2.0       | 2.0          | 0.0               |      |
| BPM0002     | 71 Studies in Biotech- Pharmaceutical Industry                                       | 2.0       | 2.0          | 0.0               |      |
| BPM0003     | 72 Biotech Product Development and Intellectual Property Management                  | 3.0       | 3.0          | 0.0               |      |
| BPM0004     | 73 Research and Design Management in Bioindustry                                     | 3.0       | 3.0          | 0.0               |      |
| BPM0009     | 74 Translational Medicine  | 2.0       | 2.0          | 0.0               |      |
| BIC9044     | 75 Virology  | 2.0       | 2.0          | 0.0               |      |
| BIC9047     | 76 Cross-Domain Learning Chinese Medicine and Health                                 | 2.0       | 2.0          | 0.0               |      |
| BIC9046     | 77 Curriculum Design for Scientific Inquiry and Practices                            | 2.0       | 2.0          | 0.0               |      |
| BIC9050     | 78 Plant Anatomy with Experiment   | 3.0       | 2.0          | 2.0               |      |
| BIC9049     | 79 Overview of Biomedical Development and Commercialization                          | 2.0       | 2.0          | 0.0               |      |
| BIC9048     | 80 The Application of Biotechnological Advances on Complement for Clinical Practice  | 2.0       | 2.0          | 0.0               |      |
| BIC9051     | 81 Mammalogy   | 2.0       | 2.0          | 0.0               |      |
| BIC9053     | 82 Biomethology of Cancer Research   | 3.0       | 3.0          | 0.0               |      |
| BIC9052     | 83 The Latest Modern Issues in Biomedical Research and Technology                    | 2.0       | 2.0          | 0.0               |      |
| BIC9055     | 84 Evolution of Insects  | 3.0       | 3.0          | 0.0               |      |
| BIC8023     | 85 Application of Optoelectronic Technology in Biomedical                            | 2.0       | 2.0          | 0.0               |      |
| BIC9056     | 86 E Introduction in Virology  | 2.0       | 2.0          | 0.0               |      |
| BIC9057     | 87 E Histology   | 2.0       | 2.0          | 0.0               |      |
| BIC9058     | 88 Basic and Applied Bone Biology  | 2.0       | 2.0          | 0.0               |      |
| BIC9060     | 89 Pteridology   | 3.0       | 3.0          | 0.0               |      |
| BIC9059     | 90 Plant Pathology   | 3.0       | 3.0          | 0.0               |      |
| BIC8027     | 91 E Topics in Virology  | 2.0       | 2.0          | 0.0               |      |
| BIC8025     | 92 E Introduction to Statistical Analysis  | 3.0       | 3.0          | 0.0               |      |
| BIC8030     | 93 E Comprehensive Biotech Practice-From Micro Molecular Biology to Macro Physiology | 3.0       | 3.0          | 0.0               |      |
| BIC8026     | 94 E Linear and Logistic Regression Models   | 3.0       | 3.0          | 0.0               |      |

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|-------------|--|-----------|--------------|-------------------|------|
|             |  |           | Lecture Hour | Lab/Practice Hour |      |
| BIC8028     | 95 E Apply Sciences Lead to Biotechnology Industry               | 2.0       | 2.0          | 0.0               |      |
| BIM0125     | 96 E Ecoacoustics: Principle and Application                     | 2.0       | 2.0          | 0.0               |      |
| BIM0126     | 97 E Knowledge Transformation and Dissemination for Life Science | 2.0       | 2.0          | 0.0               |      |
| OEC8155     | 98 E Bio-Chips Manufacturing Technology                          | 3.0       | 3.0          | 0.0               |      |
| BIC9063     | 99 E Plant Molecular Biology                                     | 2.0       | 2.0          | 0.0               |      |
| BIC9061     | 100 Oncology Journal Reading and Discussion                      | 2.0       | 2.0          | 0.0               |      |
| BIC9065     | 101 E Introduction to Biomaterials                               | 3.0       | 3.0          | 0.0               |      |
| BIC9064     | 102 Introduction to Biomedical Engineering                       | 3.0       | 3.0          | 0.0               |      |
| BIC9067     | 103 Internship in Ecological Industry                            | 3.0       | 0.0          | 6.0               |      |
| BIC9066     | 104 Field Ecology Survey Techniques                              | 3.0       | 3.0          | 0.0               |      |
| BIC9068     | 105 Field ecology  | 3.0       | 3.0          | 0.0               |      |

IV. Free Elective Credits: 0.0 credit is required