# MOLECULAR BIOLOGY TECHNIQUES

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| **1** | Course Title: | MOLECULAR BIOLOGY TECHNIQUES | |
| **2** | Course Code: | MBG2006 | |
| **3** | Type of Course: | Compulsory | |
| **4** | Level of Course: | First Cycle | |
| **5** | Year of Study: | 2 | |
| **6** | Semester: | 4 | |
| **7** | ECTS Credits Allocated: | 6.00 | |
| **8** | Theoretical (hour/week): | 2.00 | |
| **9** | Practice (hour/week): | 2.00 | |
| **10** | Laboratory (hour/week): | 0 | |
| **11** | Prerequisites: | None | |
| **12** | Language: | Turkish | |
| **13** | Mode of Delivery: | Face to face | |
| **14** | Course Coordinator: | Dr. Ögr. Üyesi ELİF UZ | |
| **15** | Course Lecturers: | Araştırma Görevlileri | |
| **16** | Contact information of the Course Coordinator: | Dr. Öğr. Üyesi Elif UZ YILDIRIM<br>Bursa Uludağ Üniversitesi<br>Fen-Edebiyat Fak., Moleküler Biyoloji ve Genetik Bölümü<br>elifuz@uludag.edu.tr<br>902242941776 | |
| **17** | Website: | | |
| **18** | Objective of the Course: | To comprehend the basic logic of the techniques used in molecular biology and genetics studies. | |
| **19** | Contribution of the Course to Professional Development: | To gain the capacity of choosing the right method during experimental studies. Moreover, to choose the right techiques, since the students learn the similarities and differences among methods. | |
| **20** | Learning Outcomes: | | |
| | | **1** | Learn the basic methods used in molecular biology. |
| | | **2** | Gain the capacity to design their own experiments |
| | | **3** | Learn basic equipments and consumables used in a molecular biology laboratory. |
| | | **4** | Gain the basic skills in order to work in a molecular biology laboratory. |
| | | **5** | Comprehend how to follow novel developments in the techniques used in molecular biology. |
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| **21** | Course Content: | | |

**Course Content:**

| Week | Theoretical | Practice |
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| **1** | Basic concepts of techniques used in molecular biology: A general overview I | Laboratory rules and safety (Groups A1-B1) |

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| **2** | Basic concepts of techniques used in molecular biology: A general overview II | Laboratory rules and safety (Groups A2-B2) |
| **3** | Isolation techniques (DNA, RNA and protein) | Laboratory equipments (Groups A1-B1) |
| **4** | cDNA synthesis, library preparation | Laboratory equipments (Groups A2-B2) |
| **5** | Conepts of PCR | Laboratory consumables (Groups A1-B1) |
| **6** | Types of PCR and concepts of RT-PCR | Laboratory consumables (Groups A2-B2) |
| **7** | Electrophoretic techniques (Agarose and PAGE) | Solution Preparation (Groups A1-B1) |
| **8** | Principles of hybridization techniques (Southern and Northern blot) | Solution Preparation (Groups A2-B2) |
| **9** | Principles of hybridization techniques (Western blot) | DNA Isolation (Groups A1-B1) |
| **10** | DNA sequencing techniques | DNA Isolation (Groups A2-B2) |
| **11** | siRNA/miRNA, Microarray | Spectrophotometric measurements of DNA and Agarose Gel (Groups A1-B1) |
| **12** | Genome editing using nucleases (ZFNs, TALENs and CRISPR-Cas) | Spectrophotometric measurements of DNA and Agarose Gel (Groups A2-B2) |
| **13** | ChIP, ELISA, protein sequencing | PCR and gel electrophoresis (Groups A1-B1) |
| **14** | Yeast complementation: Yeast one hybrid, yeast two hybrid and yeast three hybrid | PCR and gel electrophoresis (Groups A2-B2) |

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| **22** | Textbooks, References and/or Other Materials: | Temel ve İleri Moleküler Biyoloji Yöntemleri-Genomik ve Proteomik Analizler, Güler Temizkan, Nazlı Arda, Nobel Tıp Kitabevi, 2017. |

| Activites | Number | Duration (hour) | Total Work Load (hour) |
|---|---|---|---|
| Midterm Exam | 1 | 28.00 | |
| Theoretical | 14 | 2.00 | 28.00 |
| Quiz | 6 | 15.00 | |
| Practicals/Labs | 14 | 2.00 | 28.00 |
| Home work project | 0 | 0.00 | |
| Self study and preperation | 14 | 7.00 | 98.00 |
| Final Exam | 1 | 60.00 | |
| Homeworks | 6 | 4.00 | 24.00 |
| Total | 0 | 100.00 | |
| Projects | 0 | 0.00 | 0.00 |
| Contribution of Term (Year) Learning Activities to | 40.00 | | |
| Field Studies | 0 | 0.00 | 0.00 |
| Midterm exams | 1 | 1.00 | 1.00 |
| Contribution of Final Exam to Success Grade | 60.00 | | |
| Others | 0 | 0.00 | 0.00 |
| Total | 100.00 | | |
| Final Exams | 1 | 1.00 | 1.00 |
| Measurement and Evaluation Techniques Used in the | Midterm and final Exam questions. Moreover, lab quizzes | | |
| Total Work Load | | | 181.00 |
| Total work load/ 30 hr | | | 6.00 |
| **24 ECTS / WORK LOAD TABLE** | | | |
| ECTS Credit of the Course | | | 6.00 |

| **25** | **CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS** | | | | | | | | | | | | | | | |
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| | **PQ1** | **PQ2** | **PQ3** | **PQ4** | **PQ5** | **PQ6** | **PQ7** | **PQ8** | **PQ9** | **PQ10** | **PQ11** | **PQ12** | **PQ13** | **PQ14** | **PQ15** | **PQ16** |
| **ÖK1** | 5 | 4 | 4 | 5 | 5 | 2 | 2 | 4 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK2** | 5 | 3 | 4 | 5 | 5 | 3 | 2 | 3 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK3** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK4** | 4 | 5 | 4 | 5 | 4 | 3 | 3 | 2 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |

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| **ÖK5** | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |

| **LO: Learning Objectives PQ: Program Qualifications** | | | | | |
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| **Contribution Level:** | **1 very low** | **2 low** | **3 Medium** | **4 High** | **5 Very High** |