

# ELECTRON MICROSCOPY TECHNIQUES

|    |                                                         |                                                                                                                                                                                                                                                                                        |
|----|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Course Title:                                           | ELECTRON MICROSCOPY TECHNIQUES                                                                                                                                                                                                                                                         |
| 2  | Course Code:                                            | THE6016                                                                                                                                                                                                                                                                                |
| 3  | Type of Course:                                         | Compulsory                                                                                                                                                                                                                                                                             |
| 4  | Level of Course:                                        | Third Cycle                                                                                                                                                                                                                                                                            |
| 5  | Year of Study:                                          | 1                                                                                                                                                                                                                                                                                      |
| 6  | Semester:                                               | 2                                                                                                                                                                                                                                                                                      |
| 7  | ECTS Credits Allocated:                                 | 3.00                                                                                                                                                                                                                                                                                   |
| 8  | Theoretical (hour/week):                                | 1.00                                                                                                                                                                                                                                                                                   |
| 9  | Practice (hour/week):                                   | 4.00                                                                                                                                                                                                                                                                                   |
| 10 | Laboratory (hour/week):                                 | 0                                                                                                                                                                                                                                                                                      |
| 11 | Prerequisites:                                          | THE6005                                                                                                                                                                                                                                                                                |
| 12 | Language:                                               | Turkish                                                                                                                                                                                                                                                                                |
| 13 | Mode of Delivery:                                       | Face to face                                                                                                                                                                                                                                                                           |
| 14 | Course Coordinator:                                     | Doç.Dr. BERRİN AVCI                                                                                                                                                                                                                                                                    |
| 15 | Course Lecturers:                                       | Prof.Dr. Özhan EYİGÖR                                                                                                                                                                                                                                                                  |
| 16 | Contact information of the Course Coordinator:          | berrin@uludag.edu.tr<br>(0-224) 2954071<br>Bursa Uludağ Üniversitesi, Tıp Fakültesi, Temel Tıp Bilimleri Binası, Histoloji ve Embriyoloji Anabilim Dalı, 16059 Nilüfer, BURSA<br>(0-224) 2952525-28<br>Bursa Uludağ Üniversitesi, Tıp Fakültesi, Tüpbebek Merkezi 16059 Nilüfer, BURSA |
| 17 | Website:                                                |                                                                                                                                                                                                                                                                                        |
| 18 | Objective of the Course:                                | Edification of research specialists who can; get to know and use electron microscope, plan and carry out electron microscopical investigations, use electron microscopical techniques accurately and perfectly, solve technical problems and develop new methods.                      |
| 19 | Contribution of the Course to Professional Development: | To increase the basic knowledge and hardware in doctora education                                                                                                                                                                                                                      |
| 20 | Learning Outcomes:                                      |                                                                                                                                                                                                                                                                                        |
|    | 1                                                       | Can compare the structural properties of electron microscope with light microscope                                                                                                                                                                                                     |
|    | 2                                                       | Can explain the operational principle of the electron microscope                                                                                                                                                                                                                       |
|    | 3                                                       | Can describe the area of usage of the electron microscope                                                                                                                                                                                                                              |
|    | 4                                                       | Can implement routine electron microscopical processes in order and accurately                                                                                                                                                                                                         |
|    | 5                                                       | Can correlate the cause and effect of electron microscopical                                                                                                                                                                                                                           |
|    | 6                                                       | Can practice different electron microscopical procedures                                                                                                                                                                                                                               |
|    | 7                                                       | Can recognize the equipments of electron microscopy laboratory                                                                                                                                                                                                                         |
|    | 8                                                       | Can plan and carry out electron microscopical investigations                                                                                                                                                                                                                           |
|    | 9                                                       | Can propose solutions for problems experienced in the electron microscopy laboratory                                                                                                                                                                                                   |
|    | 10                                                      |                                                                                                                                                                                                                                                                                        |
| 21 | Course Content:                                         |                                                                                                                                                                                                                                                                                        |

|                                                                  | Course Content:                                                                               |                                                                       |                 |                        |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------|------------------------|
| Week                                                             | Theoretical                                                                                   | Practice                                                              |                 |                        |
| 1                                                                | The aim and learning objectives of the course<br><br>Short history of the electron microscope | Introduction of the electron microscopy laboratory                    |                 |                        |
| 2                                                                | Structure of the electron microscope and the principles of function                           | Introduction of the electron microscope                               |                 |                        |
| 3                                                                | Fixation and fixatives                                                                        | Preparation of fixatives                                              |                 |                        |
| 4                                                                | Buffer solutions                                                                              | Preparation of buffers                                                |                 |                        |
| 5                                                                | Principles of tissue preparation                                                              | Application of tissue preparation protocols                           |                 |                        |
| 6                                                                | Embedding mediums for electron microscopy                                                     | Preparation of embedding mediums                                      |                 |                        |
| 7                                                                | Embedding procedures                                                                          | Application of tissue embedding methods                               |                 |                        |
| 8                                                                | Principles of sectioning                                                                      | Preparing glass knives                                                |                 |                        |
| 9                                                                | Features of thick and thin sections                                                           | Sectioning by using ultratome                                         |                 |                        |
| 10                                                               | Methods and materials for staining thin sections                                              | Staining of thin sections                                             |                 |                        |
| 11                                                               | Principles of examination, evaluation and photographing on TEM                                | Practice of examination and photographing on TEM                      |                 |                        |
| 12                                                               | Principles and methods of the dark room                                                       | Practice of developing and printing                                   |                 |                        |
| Activites                                                        |                                                                                               | Number                                                                | Duration (hour) | Total Work Load (hour) |
| 14                                                               | Electron microscopical artifacts and problem solving                                          | 14                                                                    | 1.00            | 14.00                  |
| Practicals/Labs                                                  |                                                                                               | 14                                                                    | 4.00            | 56.00                  |
| 22                                                               | Textbooks, References and/or Other Materials.                                                 | 1                                                                     | 1.00            | 14.00                  |
| Self study and preparation                                       |                                                                                               | 14                                                                    | 1.00            | 14.00                  |
| Homeworks                                                        |                                                                                               | 0                                                                     | 0.00            | 0.00                   |
| Projects                                                         |                                                                                               | 2                                                                     | 0.00            | 0.00                   |
| Field Studies                                                    |                                                                                               | 0                                                                     | 0.00            | 0.00                   |
| Midterm exams                                                    |                                                                                               | 0                                                                     | 0.00            | 0.00                   |
| 22                                                               | Assesment                                                                                     | 1                                                                     | 1.00            | 1.00                   |
| Others                                                           |                                                                                               | 0                                                                     | 0.00            | 0.00                   |
| TERM LEARNING ACTIVITIES                                         |                                                                                               | 14                                                                    | 1.00            | 14.00                  |
| Final Exams                                                      |                                                                                               | 1                                                                     | 1.00            | 1.00                   |
| Total Work Load                                                  |                                                                                               |                                                                       |                 | 85.00                  |
| Total work load/ 30 hr                                           |                                                                                               | 0                                                                     | 0.00            | 2.83                   |
| ECTS Credit of the Course                                        |                                                                                               |                                                                       |                 | 3.00                   |
| Final Exam                                                       |                                                                                               | 1                                                                     | 100.00          |                        |
| Total                                                            |                                                                                               | 1                                                                     | 100.00          |                        |
| Contribution of Term (Year) Learning Activities to Success Grade |                                                                                               | 0.00                                                                  |                 |                        |
| Contribution of Final Exam to Success Grade                      |                                                                                               | 100.00                                                                |                 |                        |
| Total                                                            |                                                                                               | 100.00                                                                |                 |                        |
| Measurement and Evaluation Techniques Used in the Course         |                                                                                               | Written exam consisting of multiple choice and / or classic questions |                 |                        |
| 24                                                               | ECTS / WORK LOAD TABLE                                                                        |                                                                       |                 |                        |

| 25                                                    | CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS |     |     |       |     |     |          |     |     |        |      |      |             |      |      |      |
|-------------------------------------------------------|---------------------------------------------------------------|-----|-----|-------|-----|-----|----------|-----|-----|--------|------|------|-------------|------|------|------|
|                                                       | PQ1                                                           | PQ2 | PQ3 | PQ4   | PQ5 | PQ6 | PQ7      | PQ8 | PQ9 | PQ10   | PQ11 | PQ12 | PQ13        | PQ14 | PQ15 | PQ16 |
| ÖK1                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK2                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK3                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK4                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK5                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK6                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK7                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK8                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| ÖK9                                                   | 4                                                             | 5   | 4   | 0     | 3   | 5   | 5        | 0   | 3   | 3      | 3    | 3    | 0           | 0    | 0    | 0    |
| LO: Learning Objectives    PQ: Program Qualifications |                                                               |     |     |       |     |     |          |     |     |        |      |      |             |      |      |      |
| Contribution Level:                                   | 1 very low                                                    |     |     | 2 low |     |     | 3 Medium |     |     | 4 High |      |      | 5 Very High |      |      |      |