

## UNDERGRADUATE CURRICULUM DETAILS

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------|---------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------|----------------|-------------|
| <b>Course Title:</b><br>Glass Chemistry and Technology |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     | <b>Code :</b>                               |                                                     | <b>Faculty or VS:Science-Literature Faculty</b><br><b>Programme: Chemistry</b> |                |             |
| <b>Education and Teaching Methods</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                | <b>Credits</b> |             |
| <b>Lecture</b>                                         | <b>Application</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Laboratory</b>  | <b>Project/<br/>Field Study</b>     | <b>Hw.</b>                                  | <b>Other</b>                                        | <b>Total</b>                                                                   | <b>Credit</b>  | <b>ECTS</b> |
| 2                                                      | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                  | 0                                   | 0                                           | 0                                                   | 2                                                                              | 2              | 3           |
| <b>Semester</b>                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    | <b>Language</b>                     |                                             | <b>Turkish</b>                                      |                                                                                |                |             |
| <b>Course Type</b>                                     | Basic Scientific                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    | Scientific <input type="checkbox"/> | Technical Elective <input type="checkbox"/> | Social Elective <input checked="" type="checkbox"/> |                                                                                |                |             |
| <b>Course Objectives</b>                               | Physical and chemical properties of glass, glass composition and raw materials, to give students the selective concepts of glass chemistry to develop of thinking about                                                                                                                                                                                                                                                                                                                                               |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Learning Outcomes and Competences</b>               | To learn history and usage areas of glass, to learn physical and chemical properties of glass, to learn oxides forming glass structure, to learn effect of glass composition on glass properties                                                                                                                                                                                                                                                                                                                      |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Textbook and /or References</b>                     | Ceramics and Glasses, Engineered Materials Handbook, Volume 4, ASM International, 1991.<br>Glasses and their applications, H. Rawson, The Institute of Metals, 1991.<br>The Technology of Glass and Ceramic (An Introduction), J. Hlavac, Glass Science and Technology 4, Elsevier Scientific Publishing Company, 1983.<br>Glass: Science and Technology Volume 2 Processing, D.R.Uhlmann, N.J.Kreidl, Basimevi: Academic Press, 1984.<br>Turkey Sise Cam Factory Education Cover Seramik Teknolojisi Glass 1 Glass 2 |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>ASSESSMENT CRITERIA</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Theoretical Courses</b>                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     | <b>Project Course and Graduation Study</b>  |                                                     |                                                                                |                |             |
|                                                        | <b>If any, mark as (X)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Percent (%)</b> |                                     | <b>If any, mark as (X)</b>                  | <b>Percent (%)</b>                                  |                                                                                |                |             |
| Midterm Exams                                          | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40                 | Midterm Exams                       |                                             |                                                     |                                                                                |                |             |
| Quizzes                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    | Midterm Controls                    |                                             |                                                     |                                                                                |                |             |
| Homeworks                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    | Term Paper                          |                                             |                                                     |                                                                                |                |             |
| Term Paper (Projects, reports, ....)                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    | Oral Examination                    |                                             |                                                     |                                                                                |                |             |
| Laboratory Work                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    | Final Exam                          |                                             |                                                     |                                                                                |                |             |
| Final Exam                                             | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 60                 | Other                               |                                             |                                                     |                                                                                |                |             |
| Other                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Week</b>                                            | <b>Subjects</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 1                                                      | Definition of glass, history, elements and periodic table                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 2                                                      | Chemical bonds, crystal and amorphous structures                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 3                                                      | Chemical structure of glass, relations between viscosity and temperature                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 4                                                      | Theories of glass formation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 5                                                      | Glass building materials, glass oxides, structure of oxide glasses                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 6                                                      | Glass composition, basic glass types                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 7                                                      | Basic glass properties, glass color, surface tension, thermal expansion coefficient, viscosity, density, heat capacity                                                                                                                                                                                                                                                                                                                                                                                                |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 8                                                      | Midterm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 9                                                      | Chemical resistance of glass, optical properties of glass                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 10                                                     | Glass Raw Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 11                                                     | Glass grafting, chemical and mechanical methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 12                                                     | Properties of raw materials, coloring and coloring of glass                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 13                                                     | Raw material sources and supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| 14                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Instructors</b>                                     | Prof.Dr. Figen Kurtuluş                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>e-mail</b>                                          | fdemiral@balikesir.edu.tr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                     |                                             |                                                     |                                                                                |                |             |
| <b>Website</b>                                         | <a href="http://kimya.balikesir.edu.tr/dersler.htm">http://kimya.balikesir.edu.tr/dersler.htm</a>                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                                     |                                             |                                                     |                                                                                |                |             |