| 1.     Course title     Joining techniques       2.     Code     311       3.     Study group(s)     PI, TML, TI, HIMV, MJSE, IIM, MV,EE, MHT,A       1ND, DS     The organizer of the study program (unit, institute, department)     Faculty of Mechanical Engineering - Skopje, Ss. Cyril and Methodius University in Skopje       5.     Level (first, second, third degree)     First     Number of ECTS       6.     Academic year / semester     winter     7.     Number of ECTS       8.     Professor     Prof. Dobre Runchev, Ph.D     9.       9.     Preconditions for enrolling the course     Mechanical materials 1 - passed (Materials, technologies and testing - passed for 10.       10.     Purpose of the course program (competences):     Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:     Introduction to various joining techniques: welding, soldering, brazing and adhesive born Introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectu  | JS,<br>6<br>• IND<br>on  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| 2.     Code     311       3.     Study group(s)     PI, TML, TI, HIMV, MJSE, IIM, MV,EE, MHT,A IND, DS       4.     The organizer of the study program (unit, institute, department)     Faculty of Mechanical Engineering - Skopje, Ss. Cyril and Methodius University in Skopje       5.     Level (first, second, third degree)     First     7.     Number of ECTS credits       6.     Academic year / semester     winter     7.     Number of ECTS credits       8.     Professor     Prof. Dobre Runchev, Ph.D     9.       9.     Preconditions for enrolling the course Mechanical materials 1 - passed Materials, technologies and testing - passed for       10.     Purpose of the course program (competences):     Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:     Introduction to various joining techniques: welding, soldering, brazing and adhesive bond ing. Recognition of their basics of adhesive bonding. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques:       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time perio   | JS,<br>6<br>• IND<br>on  |  |  |  |  |  |  |
| 3.     Study group(s)     PI, TML, TI, HIMV, MJSE, IIM, MV,EE, MHT,A<br>IND, DS       4.     The organizer of the study program<br>(unit, institute, department)     Faculty of Mechanical Engineering - Skopje,<br>Ss. Cyril and Methodius University in Skopje       5.     Level (first, second, third degree)     First       6.     Academic year / semester     winter     7.       7.     Number of ECTS<br>credits       8.     Professor     Prof. Dobre Runchev, Ph.D       9.     Preconditions for enrolling the course<br>Materials, technologies and testing - passed<br>Materials, technologies and testing - passed for<br>Materials, technologies and testing - passed for<br>Network (Comptences):       10.     Purpose of the course program (competences):       11.     Contents of the course program:       11.     Contents of the course program:       11.     Introduction to various joining techniques: welding, soldering, brazing and adhesive born<br>Introducing basics of welding with thermo-chemical heat sources, electric arc, electric<br>resistance, and other electrical and mechanical sources. Introduction to the basics of so<br>and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir<br>related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/or<br>work on project assignments, individual study.       13.     Total available time period </th <th>JS,<br/>6<br/>• IND<br/>on</th>  | JS,<br>6<br>• IND<br>on  |  |  |  |  |  |  |
| 4.     The organizer of the study program (unit, institute, department)     Faculty of Mechanical Engineering - Skopje, Ss. Cyril and Methodius University in Skopje       5.     Level (first, second, third degree)     First       6.     Academic year / semester     winter     7.     Number of ECTS credits       8.     Professor     Prof. Dobre Runchev, Ph.D     P       9.     Preconditions for enrolling the course     Mechanical materials 1 - passed Materials, technologies and testing - passed fc       10.     Purpose of the course program (competences):     Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive born Introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time assessment     30+30+ 0+8+112=180 hours       14.     Available time assessment     15.  | 6<br><u>· IND</u><br>on  |  |  |  |  |  |  |
| 5.     Level (first, second, third degree)     First     Image: Construction of the construction to construction of pole construction of pole | 6<br>• IND<br>on   |  |  |  |  |  |  |
| 6.     Academic year / semester     winter     7.     Number of ECTS credits       8.     Professor     Prof. Dobre Runchev, Ph.D       9.     Preconditions for enrolling the course     Mechanical materials 1 - passed       10.     Purpose of the course program (competences):     Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bonding. Introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educa   | 6<br>• IND<br>on   |  |  |  |  |  |  |
| 8.     Professor     Prof. Dobre Runchev, Ph.D       9.     Preconditions for enrolling the course     Mechanical materials 1 - passed<br>Materials, technologies and testing - passed fc       10.     Purpose of the course program (competences):     Identifying various types of joining techniques: welding, soldering, brazing and adhesive<br>bonding. Recognition of their basic characteristics, mode of implementation and applicat<br>areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bond<br>Introducing basics of welding with thermo-chemical heat sources, electric arc, electric<br>resistance, and other electrical and mechanical sources. Introducing the basics of so<br>and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir<br>related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o<br>work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15       16.     Other activity module     16.1.  | on   |  |  |  |  |  |  |
| 9.     Preconditions for enrolling the course     Mechanical materials 1 - passed<br>Materials, technologies and testing - passed for<br>Materials, technologies and testing - passed for<br>Purpose of the course program (competences):       10.     Purpose of the course program (competences):       Identifying various types of joining techniques: welding, soldering, brazing and adhesive<br>bonding. Recognition of their basic characteristics, mode of implementation and applical<br>areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bond<br>Introducing basics of welding with thermo-chemical heat sources, electric arc, electric<br>resistance, and other electrical and mechanical sources. Introduction to the basics of so<br>and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir<br>related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/or<br>work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures<br>work     16.1.  | on   |  |  |  |  |  |  |
| 10.     Purpose of the course program (competences):       Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bond introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures     3       16.     Other activity module     16.1.     Project assignments     3  | on<br>   |  |  |  |  |  |  |
| Identifying various types of joining techniques: welding, soldering, brazing and adhesive bonding. Recognition of their basic characteristics, mode of implementation and applicat areas.       11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bond Introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures       16.     Other activity module     16.1.     Project assignments   | on<br>   |  |  |  |  |  |  |
| 11.     Contents of the course program:       Introduction to various joining techniques: welding, soldering, brazing and adhesive bond Introducing basics of welding with thermo-chemical heat sources, electric arc, electric resistance, and other electrical and mechanical sources. Introduction to the basics of so and brazing. Introducing the basics of adhesive bonding. Introducing the safety in weldir related processes. The symbolic representation of joining techniques on drawings.       12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/o work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures work       16.     Other activity module     16.1.     Project assignments  | ina  |  |  |  |  |  |  |
| 12.     Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/or work on project assignments, individual study.       13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures       16.     Other activity module     16.1.     Project assignments  | Contents of the course program:<br>Introduction to various joining techniques: welding, soldering, brazing and adhesive bonding.<br>Introducing basics of welding with thermo-chemical heat sources, electric arc, electric<br>resistance, and other electrical and mechanical sources. Introduction to the basics of soldering<br>and brazing. Introducing the basics of adhesive bonding. Introducing the safety in welding and<br>related processes. The symbolic representation of joining techniques on drawings. |  |  |  |  |  |  |
| 13.     Total available time period     6ECTSx30 hours =180 hours       14.     Available time assessment     30+30+ 0 +8+112=180 hours       15.     Educational activity module     15.1.     Teaching lectures     3       16.     Other activity module     16.1.     Project assignments     1   | Study methods: Interactive lectures, auditory and/or laboratory practice, individual and/or team work on project assignments, individual study.  |  |  |  |  |  |  |
| 14. Available time assessment     30+30+ 0 +8+112=180 hours       15. Educational activity module     15.1. Teaching lectures       16. Other activity module     16.1. Project assignments   |  |  |  |  |  |  |  |
| 15.     Educational activity module     15.1.     Teaching lectures     15.2.       15.2.     Practice, seminars, team work     16.1.     Project assignments   |  |  |  |  |  |  |  |
| 15.2.     Practice, seminars, team work       16.     Other activity module       16.1.     Project assignments   | 0 hours  |  |  |  |  |  |  |
| 16. Other activity module 16.1. Project assignments   | 0 hours  |  |  |  |  |  |  |
|   | 0 hours  |  |  |  |  |  |  |
| 16.2. Selfrunning assignments   | 8 hours  |  |  |  |  |  |  |
| 16.3. Home studying 1   | 2 hours  |  |  |  |  |  |  |
| 7. Evaluation methods   |  |  |  |  |  |  |  |
| 17.1. Tests 80  |  |  |  |  |  |  |  |
| 17.2. Projects  | 0 points   |  |  |  |  |  |  |
| 17.3. Activity and participation  | 0 points   |  |  |  |  |  |  |
| 18. Evaluation criteria (points and marks) Under 50 5   | five) (E)  |  |  |  |  |  |  |
| 51 - 60 points 6  | nve)(F)  |  |  |  |  |  |  |
| 61 - 70 points 7 (se  | (six) (E)  |  |  |  |  |  |  |
|   | (six) (E)<br>(en) (D)  |  |  |  |  |  |  |
| 91 - 90 points 9 (  | (six) (E)<br>(en) (D)<br>ght) (C)  |  |  |  |  |  |  |
| 19. Signature and final exam requirements Realization of activities 15.1. 15.2. 16.2  | (six) (E)<br>(en) (D)<br>(ght) (C)<br>(ine) (B)<br>(A)   |  |  |  |  |  |  |
| 20.   Language used for performing the tracking   Macedonian language   | (six) (E)<br>ven) (D)<br>ght) (C)<br>ine) (B)<br>ten) (A)  |  |  |  |  |  |  |

| 21. | Method used for following the teaching quality |                 |                     | Questioners and other forms of continues evaluation                    |   |      |  |
|-----|--|-----------------|---------------------|--|---|------|--|
| 22. | 2. References                                  |                 |                     |  |   |      |  |
|     |  | Main references |                     |  |   |      |  |
|     |  | No.             | Author              | Title  | Publisher   | Year |  |
|     |  | 1.              | Добре Рунчев        | Техники на заварување<br>- скрипта                                     | Машински<br>факултет -<br>Скопје                    | 2011 |  |
|     | 22.1.  | 2.              | Добре Рунчев        | Неконвенционални<br>постапки на спојување                              | Универзитет<br>Св. Кирили и<br>Методиј во<br>Скопје | 2004 |  |
|     |  | 3.              | Дончо Чалоски       | Заварување   | Универзитет<br>Св. Кирили и<br>Методиј во<br>Скопје | 1983 |  |
|     | Additional references                          |                 |                     |  |   |      |  |
|     |  | No.             | Author              | Title  | Publisher   | Year |  |
|     | 22.2   | 1.              | Helmut Richter, u.a | Fügetechnik,<br>Schweßtechnik  | DVS Verlag  | 1995 |  |
|     | 22.2.  | 2.              | Richard A. Strahl   | Introduction to Welding<br>Engineering                                 | Kendall Hunt<br>Pub Co                              | 2009 |  |
|     |  | 3.              | M. G. Nicholas      | Joining processes:<br>introduction to brazing<br>and diffusion bonding | Kluwer<br>Academic<br>Publishers                    | 1998 |  |