

## Universitas Negeri Surabaya Faculty of Engineering, Mechanical Engineering Undergraduate Study Program

Document Code

## SEMESTER LEARNING PLAN

| Courses                        |                                                                                                    |                                                                                 | CODE                                                                                                               |                            |                                              | Cou                          | rse Fa                          | milv                               |                       | 0                       | Credit                          | Weig                            | ht                            |                              | SEME                           | STER           | Cor                         | npilati                     |
|--------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------|------------------------------|---------------------------------|------------------------------------|-----------------------|-------------------------|---------------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------|----------------|-----------------------------|-----------------------------|
|                                |                                                                                                    |                                                                                 |                                                                                                                    |                            |                                              | 000                          |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                | Dat                         | e                           |
| Welding Desi                   | -                                                                                                  |                                                                                 | 2120102140                                                                                                         | 6                          |                                              |                              |                                 |                                    | 1                     |                         |                                 |                                 | CTS=                          |                              |                                | 5              |                             | il 5, 20                    |
| AUTHORIZAT                     | ΓΙΟΝ                                                                                               |                                                                                 | SP Develop                                                                                                         | ber                        |                                              |                              |                                 |                                    | Со                    | urse                    | Clust                           | er Co                           | ordina                        | tor                          | Study                          | Progra         | am Co                       | ordina                      |
|                                |                                                                                                    |                                                                                 | Novi Sukma                                                                                                         | a Dras                     | tiawati                                      |                              |                                 |                                    | Nov                   | /i Suł                  | kma D                           | rastiav                         | wati                          |                              | Ir. Pr                         | iyo He<br>S.T. | ru Adiv                     |                             |
| Learning<br>model              | Case Studies                                                                                       |                                                                                 |                                                                                                                    |                            |                                              |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                | ,                           |                             |
| Program                        | PLO study pro                                                                                      | aram 1                                                                          | that is char                                                                                                       | aed t                      | o the co                                     | ourse                        | 1                               |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
| Learning<br>Outcomes           | Program Object                                                                                     | <u> </u>                                                                        |                                                                                                                    | 5                          |                                              |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
| (PLO)                          | PO - 1                                                                                             | 1                                                                               | ing design kn                                                                                                      | owled                      | lae                                          |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PO - 2                                                                                             | -                                                                               | rimentation a                                                                                                      |                            | •                                            | sis                          |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PO - 3                                                                                             |                                                                                 | em analysis                                                                                                        |                            | ,, <b>,</b>                                  |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PO - 4                                                                                             |                                                                                 | nunication                                                                                                         |                            |                                              |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PO - 5                                                                                             |                                                                                 | ct and cost m                                                                                                      | anad                       | ement                                        |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PLO-PO Matrix                                                                                      |                                                                                 |                                                                                                                    |                            |                                              |                              |                                 |                                    |                       |                         |                                 |                                 |                               |                              |                                |                |                             |                             |
|                                | PO Matrix at th                                                                                    | le end                                                                          | PO-1<br>PO-2<br>PO-3<br>PO-4<br>PO-5<br>of each lea                                                                | rning                      | j stage                                      | (Sub-                        | PO)                             |                                    |                       |                         | 14/22                           |                                 |                               |                              |                                |                |                             |                             |
|                                |                                                                                                    | PC<br>PC<br>PC                                                                  | P.O<br>D-1<br>D-2<br>D-3<br>D-4<br>D-5                                                                             | 1                          | 2 3                                          | 3 4                          | 5                               | 6                                  | 7                     | 8                       | 9<br>9                          | к<br>10                         | 11                            | 12                           | 13                             | 14             | 15                          | 16                          |
| Short<br>Course<br>Description | This course cove<br>Welding heat tra<br>welding), Butt we<br>individual project:                   | PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC                                          | D-1<br>D-2<br>D-3<br>D-4<br>D-5<br>Definition of<br>Group proje                                                    | Weldi                      | ing / We                                     | Iding 1                      | Techniq<br>Dis incl             | ues, Tuding                        | ypes                  | of w                    | 9<br>elding                     | 10<br>I, Type<br>/eld d         | es of w                       | elding                       | joints<br>t weldi              | and we         | elding                      | positio                     |
| Course                         | Welding heat tra<br>welding), Butt we                                                              | PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC                                          | D-1<br>D-2<br>D-3<br>D-4<br>D-5<br>Definition of<br>Group proje                                                    | Weldi                      | ing / We                                     | Iding 1                      | Techniq<br>Dis incl             | ues, Tuding                        | ypes                  | of w                    | 9<br>elding                     | 10<br>I, Type<br>/eld d         | es of w                       | elding                       | joints<br>t weldi              | and we         | elding                      | positio                     |
| Course<br>Description          | Welding heat tra<br>welding), Butt we<br>individual projects<br>Main :<br>1. 1. Americ             | PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>P | D-1<br>D-2<br>D-3<br>D-4<br>D-5<br>Definition of<br>Group proje<br>( identifying of<br>elding Society<br>sk Group. | Weldii<br>cts, V<br>of but | ing / We<br>Velding<br>t welding<br>4. The E | Iding T<br>symbo<br>g), stre | Techniq<br>Dis incl<br>ess in v | ues, T<br>uding<br>velds<br>ket Ha | ypes<br>ident<br>n ge | of w<br>ifying<br>neral | 9<br>elding<br>g of w<br>, sear | 10<br>, Type<br>/eld d<br>m web | es of w<br>rawing<br>ds, stre | elding<br>, Fille<br>ess dis | joints<br>t weldi<br>stributio | and we         | elding<br>entifyir<br>eam v | positio<br>g of f<br>/elds, |
| Course<br>Description          | Welding heat tra<br>welding), Butt we<br>individual project:<br>Main :<br>1. 1. Americ<br>Presiden | PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>PC<br>P | D-1<br>D-2<br>D-3<br>D-4<br>D-5<br>Definition of<br>Group proje<br>( identifying of<br>elding Society<br>sk Group. | Weldii<br>cts, V<br>of but | ing / We<br>Velding<br>t welding<br>4. The E | Iding T<br>symbo<br>g), stre | Techniq<br>Dis incl<br>ess in v | ues, T<br>uding<br>velds<br>ket Ha | ypes<br>ident<br>n ge | of w<br>ifying<br>neral | 9<br>elding<br>g of w<br>, sear | 10<br>, Type<br>/eld d<br>m web | es of w<br>rawing<br>ds, stre | elding<br>, Fille<br>ess dis | joints<br>t weldi<br>stributio | and we         | elding<br>entifyir<br>eam v | positio<br>g of f<br>/elds, |

|                    |                              | <ol> <li>4. Groov</li> <li>5. Ilman,</li> <li>6. Okumi</li> <li>7. Prasel<br/>Balai Bes</li> </ol>        | er, Mikell P. 2012 . I<br>Noer. 2011. Diktat ⊺<br>ura Toshie, Wiryosu<br>yawanto, Lukas Ok<br>sar Latihan Kerja Inc<br>awati, Novi Sukma                                                                                               | ati Novi . 2014. Job Sheet<br>ntroduction to Manufacturi<br>Feknologi Las. Yogyakarta<br>marno Harsono. 2000. Tel<br>ta. 2012. Ringkasan Mate<br>Justri<br>dan Zakiyya, Hanna. 201                                                                         | ing Process. Ne<br>i :Universitas G<br>knologi Pengela<br>ri Sub Bidang F                 | ew Jersey : John Wiley ar<br>adjah Mada.<br>asan Logam. Jakarta : Pr.<br>Pengelasan SMAW. Sera | adnya Paramita.<br>ng : Dikdas Tekn                                                                                                                                                                                                                 | Ū.                       |
|--------------------|------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Support<br>ecturer |                              | Novi Sukma Dras                                                                                           | tiawati, S.T., M.Eng                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                            |                                                                                           |                                                                                                |                                                                                                                                                                                                                                                     |                          |
| Week-              |                              | al abilities of<br>h learning<br>ge                                                                       | Ev                                                                                                                                                                                                                                     | aluation                                                                                                                                                                                                                                                   | Lear<br>Studer                                                                            | lp Learning,<br>ning methods,<br>nt Assignments,<br>stimated time]                             | Learning<br>materials<br>[ References                                                                                                                                                                                                               | Assessment<br>Weight (%) |
|                    |                              | b-PO)                                                                                                     | Indicator                                                                                                                                                                                                                              | Criteria & Form                                                                                                                                                                                                                                            | Offline (<br>offline )                                                                    | Online ( online )                                                                              | 1                                                                                                                                                                                                                                                   |                          |
| (1)                |                              | (2)                                                                                                       | (3)                                                                                                                                                                                                                                    | (4)                                                                                                                                                                                                                                                        | (5)                                                                                       | (6)                                                                                            | (7)                                                                                                                                                                                                                                                 | (8)                      |
| 1                  | en<br>kni<br>CC<br>De<br>cla | ience and<br>gineering<br>owledge: Sub<br>D/CPMK 1<br>escribe the<br>issification of<br>elding techniques | <ol> <li>Able to<br/>describe the<br/>definition of<br/>welding<br/>techniques</li> <li>Able to<br/>describe the<br/>history of<br/>welding</li> <li>Able to<br/>describe the<br/>development<br/>of welding<br/>technology</li> </ol> | Criteria:<br>1.Report<br>assessment<br>criteria:<br>2.a. Compliance<br>with reporting<br>format<br>3.b. Results of<br>analysis of the<br>articles read<br>4.b. Conclusions<br>and suggestions<br>are prepared<br>5.Essay test criteria:<br>Compliance with | Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and<br>assignments<br>2 X 50 |                                                                                                | Material:<br>Definition of<br>welding<br>techniques,<br>history of<br>welding, and<br>development<br>of welding<br>technology<br><b>References:</b><br>8. Drastiawati,<br>Novi Sukma<br>and Zakiyya,<br>Hanna. 2018.<br>Manufacturing<br>Process II | 3%                       |

(Welding

Surabaya

University.

Material:

of welding

Various types

Reference: 8.

Drastiawati,

Novi Sukma

and Zakiyya,

Hanna. 2018.

Manufacturing

Techniques). Surabaya:

Process II (Welding

Surabaya

University.

State

3%

State

Techniques). . Surabaya:

the answer key

Attendance and

Lectures,

questions

answers,

and

and

2 X 50

discussions,

assignments

6.Participation

assessment:

activeness in

lectures 7.Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 Form of Assessment : **Participatory Activities** 

Criteria:

1.Report

criteria:

format

assessment

2.a. Compliance

with reporting

analysis of the

articles read

4.b. Conclusions

are prepared 5.Essay test criteria:

and suggestions

Compliance with

the answer key 6.Participation assessment: Attendance and activeness in lectures 7.Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 Form of Assessment : Participatory Activities

3.b. Results of

1.able to

describe

various

types of

welding

describe the

processes of

2.Able to

work

various

types of

welding

Science and engineering knowledge: Sub CO/CPMK 1 Describe welding

classifications

2

| 2 | Science and                                                                                                                     | 1 Da abla ta                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Critoria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Loctures                                                                                         | Matorial                                                                                                                                                                                                                                                                        | <b>5</b> 04 |
|---|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 3 | Science and<br>engineering<br>knowledge: Sub<br>CO/CPMK 1<br>Describe the types<br>of welded joints<br>and welding<br>positions | <ol> <li>Be able to<br/>describe the<br/>types of<br/>welded<br/>joints</li> <li>Able to<br/>describe<br/>welded<br/>joints</li> <li>Able to<br/>analyze<br/>welded<br/>joints in the<br/>field of<br/>mechanical<br/>design</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>choose the<br/>right welding<br/>position<br/>according to<br/>the design<br/>and AWS<br/>standards</li> </ol> | Criteria:<br>1.a. Structured tasks<br>2 Conformity with<br>reporting format<br>3 Results of<br>analysis of the<br>articles read<br>4 Conclusions and<br>suggestions are<br>prepared<br>5.Participation<br>6 Presence<br>7 Active in<br>question and<br>answer,<br>8 Seriousness in<br>attending lectures<br>9.Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Form of Assessment :<br>Test                          | - Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and 2 X 50<br>Quiz<br>assignments | Material:<br>Types of<br>welding joints<br>and welding<br>positions<br><b>References:</b><br>1. American<br>Welding<br>Society. 1994.<br>The Everyday<br>Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group. | 5%          |
| 4 | Science and<br>engineering<br>knowledge: Sub<br>CO/CPMK 1<br>Describe the types<br>of welded joints<br>and welding<br>positions | <ol> <li>Be able to<br/>describe the<br/>types of<br/>welded<br/>joints</li> <li>Able to<br/>describe<br/>welded<br/>joints</li> <li>Able to<br/>analyze<br/>welded<br/>joints in the<br/>field of<br/>mechanical<br/>design</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> <li>Able to<br/>choose the<br/>right welding<br/>position<br/>according to<br/>the design<br/>and AWS<br/>standards</li> </ol>                                                                                                                       | Criteria:<br>1.a. Structured tasks<br>2 Conformity with<br>reporting format<br>3 Results of<br>analysis of the<br>articles read<br>4 Conclusions and<br>suggestions are<br>prepared<br>5.Participation<br>6 Presence<br>7 Active in<br>question and<br>answer,<br>8 Seriousness in<br>attending lectures<br>9.Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Form of Assessment :<br>Portfolio Assessment,<br>Test | - Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and 2 X 50<br>Quiz<br>assignments | Material:<br>Types of<br>welding joints<br>and welding<br>positions<br><b>References:</b><br>1. American<br>Welding<br>Society. 1994.<br>The Everyday<br>Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group. | 5%          |

| 5 | Science and<br>engineering<br>knowledge: Sub<br>CO/CPMK 1<br>Describe the types<br>of welded joints<br>and welding<br>positions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ol> <li>Be able to<br/>describe the<br/>types of<br/>welded<br/>joints</li> <li>Able to<br/>describe<br/>welded<br/>joints</li> <li>Able to<br/>analyze<br/>welded<br/>joints in the<br/>field of<br/>mechanical<br/>design</li> <li>Able to<br/>describe the<br/>welding<br/>position</li> </ol> | Criteria:<br>1.a. Structured tasks<br>2 Conformity with<br>reporting format<br>3 Results of<br>analysis of the<br>articles read<br>4 Conclusions and<br>suggestions are<br>prepared<br>5.Participation<br>6 Presence<br>7 Active in<br>question and<br>answer,<br>8 Seriousness in<br>attending lectures<br>9.Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Forms of Assessment<br>:<br>Participatory Activities,<br>Project Results<br>Assessment / Product<br>Assessment, Tests                                                                  | - Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and 2 X 50<br>Quiz<br>assignments                                | Material:<br>Types of<br>welding joints<br>and welding<br>positions<br><b>References:</b><br>1. American<br>Welding<br>Society. 1994.<br>The Everyday<br>Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group. | 4% |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 6 | <ol> <li>Science and<br/>Engineering<br/>Knowledge<br/>SubCPMK 1.c.<br/>Able to<br/>demonstrate the<br/>correct use of<br/>specific facts<br/>about<br/>calculations in<br/>welding design<br/>(Heat Input and<br/>Welding Heat<br/>Transfer) and<br/>techniques to<br/>obtain<br/>performance<br/>behavior given<br/>certain inputs in<br/>welding design<br/>(PWHT and<br/>Pre-Heat<br/>Process for<br/>welding design).</li> <li>Experiment and<br/>data analysis<br/>Sub CPMK 3.a.<br/>Able to<br/>formulate<br/>problems<br/>(identify needs)<br/>and analyze<br/>constraints<br/>regarding<br/>welding design</li> </ol> | <ol> <li>Able to<br/>calculate<br/>welding heat<br/>transfer</li> <li>Able to<br/>formulate<br/>problems<br/>regarding<br/>heat input in<br/>welding</li> <li>Able to<br/>analyze<br/>welding heat<br/>transfer on<br/>the surface<br/>of the<br/>workpiece</li> <li>Able to find<br/>the<br/>appropriate<br/>heat<br/>treatment in<br/>the welding<br/>process</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Criteria:<br>1. Task results:<br>Compliance with<br>reporting format<br>2. Results of analysis<br>of the articles read<br>3. Conclusions and<br>suggestions are<br>prepared<br>4. Essay writing test:<br>Compliance with<br>the answer key<br>5. Participation :<br>6. Presence<br>7. Activeness in<br>questions and<br>answers,<br>seriousness in<br>attending lectures<br>8. Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Forms of Assessment<br>:<br>Participatory Activities,<br>Project Results<br>Assessment / Product<br>Assessment, Tests | Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and<br>assignments<br>Analysis of 2<br>X 50<br>calculation<br>data | Material:<br>Welding heat<br>transfer, heat<br>input, PWHT,<br>and cooling<br>processes in<br>weld metal<br><b>References:</b><br>5. Ilman,<br>Noer. 2011.<br>Diktat on<br>Welding<br>Technology.<br>Yogyakarta:<br>Gadjah Mada<br>University.                                  | 1% |

| 7 | <ol> <li>Science and<br/>Engineering<br/>Knowledge: 1.c.<br/>Able to<br/>demonstrate the<br/>appropriate use<br/>of specific facts<br/>of mathematics,<br/>science<br/>regarding<br/>welding heat<br/>transfer<br/>calculations and<br/>heat input in<br/>weld design and<br/>techniques to<br/>obtain<br/>performance<br/>behavior in weld<br/>design (PWHT<br/>and Pre-Heat<br/>Process)</li> <li>Experiments<br/>and data<br/>analysis: 3.a.<br/>Able to<br/>formulate<br/>problems<br/>(identify needs)<br/>and analyze<br/>constraints on<br/>welding design</li> </ol> | <ol> <li>Able to<br/>calculate<br/>welding heat<br/>transfer</li> <li>Able to<br/>formulate<br/>problems<br/>regarding<br/>heat input in<br/>welding</li> <li>Able to<br/>analyze<br/>welding heat<br/>transfer on<br/>the surface<br/>of the<br/>workpiece</li> <li>Able to find<br/>the<br/>appropriate<br/>heat<br/>treatment in<br/>the welding<br/>process</li> </ol> | Criteria:<br>1. Task results:<br>Compliance with<br>reporting format<br>2. Results of analysis<br>of the articles read<br>3. Conclusions and<br>suggestions are<br>prepared<br>4. Essay writing test:<br>Compliance with<br>the answer key<br>5. Participation :<br>6. Presence<br>7. Activeness in<br>questions and<br>answers,<br>seriousness in<br>attending lectures<br>8. Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Form of Assessment :<br>Participatory Activities,<br>Project Results<br>Assessment / Product<br>Assessment | Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and<br>assignments<br>Analysis of 2<br>X 50<br>calculation<br>data | Material:<br>Welding heat<br>transfer, heat<br>input, PWHT,<br>and cooling<br>processes in<br>weld metal<br><b>References:</b><br>5. Ilman,<br>Noer. 2011.<br>Diktat on<br>Welding<br>Technology.<br>Yogyakarta:<br>Gadjah Mada<br>University. | 1%  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 8 | SUB SUMATIVE<br>EXAMINATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SUB<br>SUMATIVE<br>EXAMINATION                                                                                                                                                                                                                                                                                                                                             | Criteria:<br>1.Format<br>compatibility<br>2.Conformity of the<br>contents of the<br>report with the<br>tasks carried out<br>3.Conclusion of the<br>report results<br>4.Compliance with<br>the answer key<br>5.Presence<br>6.Activeness in<br>questions and<br>answers,<br>seriousness in<br>attending lectures<br>7.Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55                                                                                                                                                                          | WRITTEN<br>TEST<br>2 X 50                                                                                                       | Material: SUB<br>SUMATIVE<br>TEST<br>References:<br>5. Ilman,<br>Noer. 2011.<br>Diktat on<br>Welding<br>Technology.<br>Yogyakarta:<br>Gadjah Mada<br>University.                                                                               | 20% |

| 9  | <ol> <li>Problem<br/>analysis: Sub<br/>CPMK4.a. Able<br/>to formulate<br/>problems and<br/>identify<br/>problems in<br/>case studies of<br/>welding design<br/>and weld failure</li> <li>Problem</li> <li>Analysis: Sub<br/>CPMK 4.b.</li> <li>Ability to<br/>recognize<br/>several<br/>solutions<br/>required in<br/>welding design</li> <li>Problem</li> <li>analysis: Sub<br/>CPMK. 4.c.</li> <li>Able to analyze<br/>alternative<br/>solutions to<br/>welding design<br/>problems</li> <li>Problem</li> <li>analysis: Sub<br/>CPMK. 4.c.</li> </ol> | <ol> <li>Able to<br/>formulate<br/>problems in<br/>welding<br/>design</li> <li>Able to<br/>make simple<br/>welding<br/>designs</li> <li>Able to find<br/>solutions in<br/>welding<br/>design</li> <li>Able to<br/>recognize<br/>weld defects</li> </ol>                       | Criteria:<br>1.Format<br>compatibility<br>2.Match the<br>contents of the<br>report with the<br>tasks carried out<br>3.Conclusion of the<br>report results<br>4.Appropriateness of<br>the group<br>presentation<br>theme<br>5.Presence<br>6.Activeness in<br>questions and<br>answers,<br>seriousness in<br>attending lectures<br>7.Score criteria:<br>Special: 90 to 100;<br>Very good: 76 to<br>89; Average: 56 to<br>75; Below<br>average: 0 to 55<br>Form of Assessment :<br>Participatory Activities,<br>Project Results<br>Assessment / Product | Lectures,<br>discussions,<br>questions<br>and<br>answers,<br>and 2 X 50<br>group<br>project<br>assignments | Material:<br>Group project<br>presentation<br>on welding<br>design for<br>machining<br>components.<br><b>References:</b><br>1. American<br>Welding<br>Society. 1994.<br>The Everyday<br>Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group. | 2% |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 10 | solutions to<br>problems in<br>welding design<br>1.Science and<br>engineering<br>knowledge: Sub<br>CO/CPMK 1<br>1.a. Ability to<br>identify specific<br>facts regarding<br>welding stress<br>calculations<br>2.Science and<br>engineering<br>knowledge: Sub<br>CO/CPMK1.c.<br>Able to<br>demonstrate the<br>proper use of<br>welding stress<br>specific facts<br>and the use of<br>welding stress<br>based on<br>welding stress                                                                                                                         | <ol> <li>Able to<br/>describe<br/>stress in<br/>welding</li> <li>Able to<br/>calculate<br/>stress in<br/>welding</li> <li>Able to<br/>analyze the<br/>results of<br/>welding<br/>voltage<br/>calculations<br/>for use in<br/>selecting the<br/>type of<br/>welding</li> </ol> | Criteria:<br>Score criteria: Special:<br>90 to 100; Very good:<br>76 to 89; Average: 56<br>to 75; Below average:<br>0 to 55<br>Form of Assessment :<br>Project Results<br>Assessment / Product<br>Assessment                                                                                                                                                                                                                                                                                                                                         | Lecture,<br>discussion<br>and<br>question<br>and answer<br>quiz<br>2 x 50<br>minutes                       | Material:<br>Various<br>welding<br>stresses and<br>welding stress<br>calculations<br><b>References:</b><br>2. Kou, Sindo.<br>2003. Welding<br>Metallurgy.<br>New Jersey :<br>John Wiley<br>and Sons.                                                                                                           | 2% |

|     |                   |                           | -                         |                   |  |                 |     |
|-----|-------------------|---------------------------|---------------------------|-------------------|--|-----------------|-----|
| 11  | 1.Science and     | 1.Able to                 | Criteria:                 | Lectures,         |  | Material:       | 4%  |
|     |                   | describe                  | Score criteria: Special:  | discussions,      |  | Welding         | 175 |
|     | Engineering       |                           | 90 to 100; Very good:     | assignments       |  | symbols         |     |
|     | Knowledge: 1.c.   | welding                   | 76 to 89; Average: 56     | $2 \times 50$     |  |                 |     |
|     | Able to           | symbols                   | to 75; Below average:     | 2 x 50<br>minutes |  | including       |     |
|     | demonstrate       | including                 | 0 to 55                   | minutes           |  | identifying of  |     |
|     | appropriate use   | identifying of            |                           |                   |  | weld drawing    |     |
|     | of specific facts | weld                      | Form of Assessment :      |                   |  | Fillet welding  |     |
|     | of mathematics,   | drawing,                  | Participatory Activities, |                   |  | (identifying of |     |
|     |                   |                           | Project Results           |                   |  | fillet welding) |     |
|     | science, and      | Fillet                    | Assessment / Product      |                   |  | Butt welding    |     |
|     | engineering to    | welding                   | Assessment                |                   |  | (identifying of |     |
|     | elicit            | (identifying              | Assessment                |                   |  | butt welding)   |     |
|     | performance       | of fillet                 |                           |                   |  | References:     |     |
|     | behavior given    | welding),                 |                           |                   |  | 1. American     |     |
|     | specific input.   | and Butt                  |                           |                   |  | Welding         |     |
|     | 2.Problem         |                           |                           |                   |  | Society. 1994.  |     |
|     |                   | welding                   |                           |                   |  |                 |     |
|     | analysis: 4.a.    | (identifying              |                           |                   |  | The Everyday    |     |
|     | Able to           | of butt                   |                           |                   |  | Pocket          |     |
|     | formulate         | welding)                  |                           |                   |  | Handbook for    |     |
|     | problems and      | 2.Able to                 |                           |                   |  | Arc Welding     |     |
|     | identify main     | describe                  |                           |                   |  | Steel. United   |     |
|     | problems /        |                           | 1                         |                   |  | States of       |     |
|     |                   | welding                   |                           |                   |  | America :       |     |
|     | variables         | symbols                   |                           |                   |  | AWS             |     |
|     |                   | including                 | 1                         |                   |  | Presidential    |     |
|     |                   | identifying of            | 1                         |                   |  | Task Group.     |     |
|     |                   | weld                      |                           |                   |  | rask Group.     |     |
|     |                   | drawing,                  |                           |                   |  |                 |     |
|     |                   |                           |                           |                   |  | Material:       |     |
|     |                   | Fillet                    |                           |                   |  | Welding         |     |
|     |                   | welding                   | 1                         |                   |  | symbols         |     |
|     |                   | (identifying              |                           |                   |  | including       |     |
|     |                   | of fillet                 |                           |                   |  | identifying of  |     |
|     |                   | welding),                 |                           |                   |  | weld drawing    |     |
|     |                   | and Butt                  |                           |                   |  | Fillet welding  |     |
|     |                   |                           |                           |                   |  |                 |     |
|     |                   | welding                   |                           |                   |  | (identifying of |     |
|     |                   | (identifying              | 1                         |                   |  | fillet welding) |     |
|     |                   | of butt                   |                           |                   |  | Butt welding    |     |
|     |                   | welding)                  |                           |                   |  | (identifying of |     |
|     |                   | 3.Able to                 |                           |                   |  | butt welding)   |     |
|     |                   | analyze                   |                           |                   |  | References:     |     |
|     |                   |                           |                           |                   |  | 5. Ilman,       |     |
|     |                   | welding                   | 1                         |                   |  | Noer. 2011.     |     |
|     |                   | symbols                   |                           |                   |  | Diktat on       |     |
|     |                   | including                 |                           |                   |  | Welding         |     |
|     |                   | identifying of            | 1                         |                   |  | Technology.     |     |
|     |                   | weld                      |                           |                   |  |                 |     |
|     |                   | drawing,                  |                           |                   |  | Yogyakarta:     |     |
|     |                   |                           | 1                         |                   |  | Gadjah Mada     |     |
|     |                   | Fillet                    | 1                         |                   |  | University.     |     |
|     |                   | welding                   |                           |                   |  |                 |     |
|     |                   | (identifying              | 1                         |                   |  | Material:       |     |
|     |                   | of fillet                 | 1                         |                   |  | Welding         |     |
|     |                   | welding),                 | 1                         |                   |  | symbols         |     |
|     |                   | and Butt                  |                           |                   |  | including       |     |
|     |                   | welding                   |                           |                   |  | identifying of  |     |
|     |                   |                           | 1                         |                   |  | weld drawing    |     |
|     |                   | (identifying              | 1                         |                   |  | Fillet welding  |     |
|     |                   | of butt                   |                           |                   |  |                 |     |
|     |                   | welding)                  |                           |                   |  | (identifying of |     |
|     |                   | <ol><li>Able to</li></ol> | 1                         |                   |  | fillet welding) |     |
|     |                   | apply                     |                           |                   |  | Butt welding    |     |
|     |                   | welding                   |                           |                   |  | (identifying of |     |
|     |                   | symbols                   | 1                         |                   |  | butt welding)   |     |
|     |                   |                           |                           |                   |  | References:     |     |
|     |                   | including                 |                           |                   |  | 6. Okumura      |     |
|     |                   | identifying of            | 1                         |                   |  | Toshie,         |     |
|     |                   | weld                      |                           |                   |  | Wiryosumarno    |     |
|     |                   | drawing,                  |                           |                   |  | Harsono.        |     |
|     |                   | Fillet                    | 1                         |                   |  | 2000. Metal     |     |
|     |                   | welding                   | 1                         |                   |  |                 |     |
|     |                   | 0                         |                           |                   |  | Welding         |     |
|     |                   | (identifying              | 1                         |                   |  | Technology.     |     |
|     |                   | of fillet                 |                           |                   |  | Jakarta :       |     |
|     |                   | welding),                 |                           |                   |  | Pradnya         |     |
|     |                   | and Butt                  | 1                         |                   |  | Paramita.       |     |
|     |                   | welding                   |                           |                   |  |                 |     |
|     |                   |                           | 1                         |                   |  |                 |     |
|     |                   | (identifying              | 1                         |                   |  |                 |     |
|     |                   |                           |                           |                   |  |                 |     |
| 1 1 |                   | of butt                   |                           |                   |  |                 |     |
|     |                   | of butt<br>welding) in    |                           |                   |  |                 |     |
|     |                   | welding) in               |                           |                   |  |                 |     |
|     |                   |                           |                           |                   |  |                 |     |

| 12       | 1.Science and     | 1.Able to                 | Criteria:                        | Lectures,    |   | Material:            | 3% |
|----------|-------------------|---------------------------|----------------------------------|--------------|---|----------------------|----|
|          | Engineering       | describe                  | Score criteria: Special:         | discussions, |   | Welding              |    |
|          | Knowledge: 1.c.   | welding                   | 90 to 100; Very good:            | assignments  |   | symbols              |    |
|          | Able to           | symbols                   | 76 to 89; Average: 56            | 2 x 50       |   | including            |    |
|          | demonstrate       | including                 | to 75; Below average:<br>0 to 55 | minutes      |   | identifying of       |    |
|          | appropriate use   | identifying of            | 01000                            |              |   | weld drawing         |    |
|          | of specific facts | weld                      | Form of Assessment :             |              |   | Fillet welding       |    |
|          | of mathematics,   | drawing,                  | Participatory Activities,        |              |   | (identifying of      |    |
|          |                   | Fillet                    | Project Results                  |              |   | fillet welding)      |    |
|          | science, and      |                           | Assessment / Product             |              |   | Butt welding         |    |
|          | engineering to    | welding                   | Assessment                       |              |   | (identifying of      |    |
|          | elicit            | (identifying              |                                  |              |   | butt welding)        |    |
|          | performance       | of fillet                 |                                  |              |   | References:          |    |
|          | behavior given    | welding),                 |                                  |              |   | 1. American          |    |
|          | specific input.   | and Butt                  |                                  |              |   | Welding              |    |
|          | 2.Problem         | welding                   |                                  |              |   | Society. 1994.       |    |
|          | analysis: 4.a.    | (identifying              |                                  |              |   | The Everyday         |    |
|          | Able to           | of butt                   |                                  |              |   | Pocket               |    |
|          | formulate         | welding)                  |                                  |              |   | Handbook for         |    |
|          | problems and      | 2.Able to                 |                                  |              |   | Arc Welding          |    |
|          | identify main     | describe                  |                                  |              |   | Steel. United        |    |
|          | problems /        | welding                   |                                  |              |   | States of            |    |
|          | variables         | symbols                   |                                  |              |   | America :            |    |
|          |                   | including                 |                                  |              |   | AWS<br>Drasidantial  |    |
|          |                   | identifying of            |                                  |              |   | Presidential         |    |
|          |                   | weld                      |                                  |              |   | Task Group.          |    |
|          |                   | drawing,                  |                                  |              |   |                      |    |
|          |                   | Fillet                    |                                  |              |   | Material:            |    |
|          |                   | welding                   |                                  |              |   | Welding              |    |
|          |                   | (identifying              |                                  |              |   | symbols              |    |
|          |                   | of fillet                 |                                  |              |   | including            |    |
|          |                   |                           |                                  |              |   | identifying of       |    |
|          |                   | welding),                 |                                  |              |   | weld drawing         |    |
|          |                   | and Butt                  |                                  |              |   | Fillet welding       |    |
|          |                   | welding                   |                                  |              |   | (identifying of      |    |
|          |                   | (identifying              |                                  |              |   | fillet welding)      |    |
|          |                   | of butt                   |                                  |              |   | Butt welding         |    |
|          |                   | welding)                  |                                  |              |   | (identifying of      |    |
|          |                   | <ol><li>Able to</li></ol> |                                  |              |   | butt welding)        |    |
|          |                   | analyze                   |                                  |              |   | References:          |    |
|          |                   | welding                   |                                  |              |   | 5. Ilman,            |    |
|          |                   | symbols                   |                                  |              |   | Noer. 2011.          |    |
|          |                   | including                 |                                  |              |   | Diktat on<br>Welding |    |
|          |                   | identifying of            |                                  |              |   | Technology.          |    |
|          |                   | weld                      |                                  |              |   | Yogyakarta:          |    |
|          |                   | drawing,                  |                                  |              |   | Gadjah Mada          |    |
|          |                   | Fillet                    |                                  |              |   | University.          |    |
|          |                   | welding                   |                                  |              |   | Oniversity.          |    |
|          |                   | (identifying              |                                  |              |   | Material:            |    |
|          |                   | of fillet                 |                                  |              |   | Welding              |    |
|          |                   | welding),                 |                                  |              |   | symbols              |    |
|          |                   | and Butt                  |                                  |              |   | including            |    |
|          |                   | welding                   |                                  |              |   | identifying of       |    |
|          |                   | (identifying              |                                  |              |   | weld drawing         |    |
|          |                   | of butt                   |                                  |              |   | Fillet welding       |    |
|          |                   | welding)                  |                                  |              |   | (identifying of      |    |
|          |                   | 4.Able to                 |                                  |              |   | fillet welding)      |    |
|          |                   | apply                     |                                  |              |   | Butt welding         |    |
|          |                   |                           |                                  |              |   | (identifying of      |    |
|          |                   | welding                   |                                  |              |   | butt welding)        |    |
|          |                   | symbols                   |                                  |              |   | References:          |    |
|          |                   | including                 |                                  |              |   | 6. Okumura           |    |
|          |                   | identifying of            |                                  |              |   | Toshie,              |    |
|          |                   | weld                      |                                  |              |   | Wiryosumarno         |    |
|          |                   | drawing,                  |                                  |              |   | Harsono.             |    |
|          |                   | Fillet                    |                                  |              |   | 2000. Metal          |    |
|          |                   | welding                   |                                  |              |   | Welding              |    |
|          |                   | (identifying              |                                  |              |   | Technology.          |    |
|          |                   | of fillet                 |                                  |              |   | Jakarta :            |    |
|          |                   | welding),                 |                                  |              |   | Pradnya              |    |
|          |                   | and Butt                  |                                  |              |   | Paramita.            |    |
|          |                   | welding                   |                                  |              |   |                      |    |
|          |                   | (identifying              |                                  |              |   |                      |    |
|          |                   | of butt                   |                                  |              |   |                      |    |
|          |                   | welding) in               |                                  |              |   |                      |    |
|          |                   | welding                   |                                  |              |   |                      |    |
|          |                   | design                    |                                  |              |   |                      |    |
|          |                   | accigit                   |                                  |              |   |                      |    |
|          |                   |                           |                                  |              |   |                      |    |
| <b>ب</b> |                   |                           |                                  | I            | ł |                      |    |

| 6.b.<br>pres<br>in yo<br>word                                                                                                      |                                                                                                                         | Form of Assessment :<br>Project Results<br>Assessment / Product<br>Assessment | Project<br>Guidance,<br>Monitoring<br>and                    | Material:<br>Individual<br>project<br>References:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2% |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| of cc<br>Able<br>lang<br>and<br>6.e.<br>deliv<br>pres<br>oral!<br>2.Proj<br>man<br>7.a.<br>proje<br>to In<br>Prob<br>field<br>Mecl | entations<br>y have been<br>created<br>4.Able to<br>agement:<br>Able to plan<br>ects related<br>dustrial<br>lems in the | n<br>f                                                                        | evaluation of<br>individual<br>projects<br>2 x 50<br>minutes | <ol> <li>American<br/>Welding<br/>Society. 1994.<br/>The Everyday<br/>Pocket<br/>Handbook for<br/>Arc Welding<br/>Steel. United<br/>States of<br/>America :<br/>AWS<br/>Presidential<br/>Task Group.</li> <li>Material:<br/>Individual<br/>project<br/>References:<br/>5. Ilman,<br/>Noer. 2011.<br/>Diktat on<br/>Welding<br/>Technology.<br/>Yogyakarta:<br/>Gadjah Mada<br/>University.</li> <li>Material:<br/>Individual<br/>project<br/>Bibliography:<br/>8. Drastiawati,<br/>Novi Sukma<br/>and Zakiyya,<br/>Hanna. 2018.<br/>Manufacturing<br/>Process II<br/>(Welding<br/>Techniques).<br/>Surabaya<br/>State<br/>University.</li> <li>Material:<br/>Individual<br/>project</li> <li>Bibliography:<br/>8. Drastiawati,<br/>Novi Sukma<br/>and Zakiyya,<br/>Hanna. 2018.<br/>Manufacturing<br/>Process II</li> <li>(Welding<br/>Techniques).<br/>Surabaya<br/>State<br/>University.</li> <li>Material:<br/>Individual<br/>project</li> <li>Bibliography:<br/>6. Okumura<br/>Toshie,<br/>Wiryosumarno<br/>Harsono.<br/>2000. Metal<br/>Welding<br/>Technology.<br/>Jakarta :<br/>Pradnya</li> </ol> |    |
|                                                                                                                                    |                                                                                                                         |                                                                               |                                                              | Pradnya                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |
|                                                                                                                                    |                                                                                                                         |                                                                               |                                                              | Pradnya<br>Paramita.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Γ                                                                                                          | ſ                                                                                                         | Г |                                                                                                                                                                                                                                                                                                                                                                                                              |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 14 | <ol> <li>Communication:<br/>6.b. Able to<br/>present content<br/>in your own<br/>words to<br/>demonstrate<br/>understanding<br/>of concepts 6.d.<br/>Able to use<br/>language well<br/>and correctly.<br/>6.e. Able to<br/>deliver<br/>presentations<br/>orally</li> <li>Project and cost<br/>management:<br/>7.a. Able to plan<br/>projects related<br/>to Industrial<br/>Problems in the<br/>field of<br/>Mechanical<br/>Engineering</li> </ol> | <ol> <li>Able to<br/>design<br/>welded<br/>joints</li> <li>Able to<br/>determine<br/>the<br/>estimated<br/>cost of<br/>welded<br/>joints</li> <li>Able to<br/>analyze<br/>projects that<br/>have been<br/>created</li> <li>Able to<br/>make written<br/>reports from<br/>the results of<br/>projects that<br/>have been<br/>created</li> <li>Able to<br/>projects that<br/>have been<br/>made well</li> </ol> | Form of Assessment :<br>Participatory Activities,<br>Project Results<br>Assessment / Product<br>Assessment | Project<br>Guidance,<br>Monitoring<br>and<br>evaluation of<br>individual<br>projects<br>2 x 50<br>minutes |   | Material:<br>Individual<br>project<br>References:<br>1. American<br>Welding<br>Society. 1994.<br>The Everyday<br>Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group.<br>Material:<br>Individual<br>project<br>References:<br>5. Ilman,<br>Noer. 2011.<br>Diktat on<br>Welding<br>Technology.<br>Yogyakarta:<br>Gadjah Mada<br>University. | 15% |
|    | <ul> <li>6.e. Able to<br/>deliver<br/>presentations<br/>orally</li> <li>2.Project and cost<br/>management:</li> <li>7.a. Able to plan<br/>projects related<br/>to Industrial<br/>Problems in the<br/>field of<br/>Mechanical</li> </ul>                                                                                                                                                                                                           | analyze<br>projects that<br>have been<br>created<br>4. Able to<br>make written<br>reports from<br>the results of<br>projects that<br>have been<br>created<br>5. Able to<br>present<br>projects that<br>have been                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                            |                                                                                                           |   | America :<br>AWS<br>Presidential<br>Task Group.<br>Material:<br>Individual<br>project<br>References:<br>5. Ilman,<br>Noer. 2011.<br>Diktat on<br>Welding<br>Technology.<br>Yogyakarta:<br>Gadjah Mada                                                                                                                                                                                                        |     |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                            |                                                                                                           |   | 6. Okumura<br>Toshie,<br>Wiryosumarno<br>Harsono.<br>2000. Metal<br>Welding<br>Technology.<br>Jakarta :<br>Pradnya<br>Paramita.                                                                                                                                                                                                                                                                              |     |

| 15 | 1.<br>Communication:<br>6.b. Able to<br>present content<br>in your own<br>words to<br>demonstrate<br>understanding                                                                                                                                                                  | 1.Able to<br>design<br>welded<br>joints<br>2.Able to<br>determine<br>the<br>estimated                                                                                                                                                                      | Form of Assessment :<br>Participatory Activities,<br>Project Results<br>Assessment / Product<br>Assessment                                                                                                   | Project<br>Guidance,<br>Monitoring<br>and<br>evaluation of<br>individual<br>projects<br>2 x 50 | Welding<br>Society. 1994.<br>The Everyday                                                                                                                                                                                                           | 20% |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|    | of concepts 6.d.<br>Able to use<br>language well<br>and correctly.<br>6.e. Able to<br>deliver<br>presentations<br>orally<br>2.Project and cost<br>management:<br>7.a. Able to plan<br>projects related<br>to Industrial<br>Problems in the<br>field of<br>Mechanical<br>Engineering | cost of<br>welded<br>joints<br>3.Able to<br>analyze<br>projects that<br>have been<br>created<br>4.Able to<br>make written<br>reports from<br>the results of<br>projects that<br>have been<br>created<br>5.Able to<br>present<br>projects that<br>have been |                                                                                                                                                                                                              | minutes                                                                                        | Pocket<br>Handbook for<br>Arc Welding<br>Steel. United<br>States of<br>America :<br>AWS<br>Presidential<br>Task Group.<br>••••••••••••••••••••••••••••••••••••                                                                                      |     |
|    |                                                                                                                                                                                                                                                                                     | made well                                                                                                                                                                                                                                                  |                                                                                                                                                                                                              |                                                                                                | Valgari Mada<br>University.<br>Material:<br>Individual<br>project<br>Bibliography:<br>8. Drastiawati,<br>Novi Sukma<br>and Zakiyya,<br>Hanna. 2018.<br>Manufacturing<br>Process II<br>(Welding<br>Techniques).<br>Surabaya:<br>State<br>University. |     |
|    |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                            |                                                                                                                                                                                                              |                                                                                                | Material:<br>Individual<br>project<br>Bibliography:<br>6. Okumura<br>Toshie,<br>Wiryosumarno<br>Harsono.<br>2000. Metal<br>Welding<br>Technology.<br>Jakarta :<br>Pradnya<br>Paramita.                                                              |     |
| 16 | SUMATIVE<br>EXAMINATION                                                                                                                                                                                                                                                             | SUMATIVE<br>EXAMINATION                                                                                                                                                                                                                                    | Criteria:<br>Score criteria: Special:<br>90 to 100; Very good:<br>76 to 89; Average: 56<br>to 75; Below average:<br>0 to 55<br>Form of Assessment :<br>Project Results<br>Assessment / Product<br>Assessment | EXAM: Final<br>Project<br>Presentation<br>2 x 50<br>minutes                                    | Material:<br>Summative<br>Examination<br>Literature: 8.<br>Drastiawati,<br>Novi Sukma<br>and Zakiyya,<br>Hanna. 2018.<br>Manufacturing<br>Process II<br>(Welding<br>Techniques).<br>Surabaya:<br>Surabaya<br>State<br>University.                   | 30% |

## Evaluation Percentage Recap: Case Study

| No | Evaluation                                      | Percentage |
|----|-------------------------------------------------|------------|
| 1. | Participatory Activities                        | 30.16%     |
| 2. | Project Results Assessment / Product Assessment | 58.16%     |
| 3. | Portfolio Assessment                            | 2.5%       |
| 4. | Test                                            | 9.16%      |
|    |                                                 | 99.98%     |

## Notes

- Learning Outcomes of Study Program Graduates (PLO Study Program) are the abilities possessed by each Study
  Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their
  study program obtained through the learning process.
- 2. The PLO imposed on courses are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- 3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- 4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- 5. Indicators for assessing ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- 7. Forms of assessment: test and non-test.
- 8. Forms of learning: Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- 9. Learning Methods: Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning,

Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods. 10. Learning materials are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.

- 11. The assessment weight is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- 12. TM=Face to face, PT=Structured assignments, BM=Independent study.