APPENDIX-4 THE CORRELATION BETWEEN COURSE GROUPS AND PLO IN NATURAL SCIENCE CLUSTER

1. Mapping Between PLOs with courses in Bachelor of Chemistry

| | | | | | | | | | P | LO | | | | | |
|-----|-------|---|-----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| No | Code | Courses | SKS | ВС | ВС- | ВС- | BC- |
| | | | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | 10 | 11 | 12 |
| ļ., | | MKU | | | ı | | I | 1 | 1 | 1 | I | 1 | 1 | 1 | |
| 1 | KU100 | Islamic Education | 2 | | | | | | | | | | | | Х |
| 2 | KU101 | Protestant Christianity Education | 2 | | | | | | | | | | | | Х |
| 3 | KU102 | Catholic Education | 2 | | | | | | | | | | | | Х |
| 4 | KU103 | Hinduism Education | 2 | | | | | | | | | | | | Х |
| 5 | KU104 | Buddhism Education | 2 | | | | | | | | | | | | Х |
| 6 | KU109 | Confucianism Education | 2 | | | | | | | | | | | | Х |
| 7 | KU105 | Civic Education | 2 | | | | | | | | | | | | Х |
| 8 | KU106 | Indonesian Language | 2 | | | | | | | | | Χ | | | |
| 9 | KU108 | Sports Education | 2 | | | | | | | | | | | | Х |
| 10 | KU110 | Pancasila Education | 2 | | | | | | | | | | | | Х |
| 11 | KU119 | Art Education | 2 | | | | | | | | | | | | Х |
| 12 | KU300 | Islamic Education Seminar | 2 | | | | | | | | | | | | Х |
| 13 | KU301 | Protestant Christianity Education Seminar | 2 | | | | | | | | | | | | Х |
| 14 | KU302 | Catholic Education Seminar | 2 | | | | | | | | | | | | Х |
| 15 | KU303 | Hinduism Education Seminar | 2 | | | | | | | | | | | | Х |
| 16 | KU304 | Buddhism Education Seminar | 2 | | | | | | | | | | | | Х |
| 17 | KU309 | Confucianism Education Seminar | 2 | | | | | | | | | | | | Х |
| 18 | KU400 | Community Service | 2 | | | | | | | | | Χ | | Х | Х |
| | | МККИ | | | | | | | | | | | | | |

| | | | | | | | | | P | LO | | | | | |
|----|-------|--|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BC -1 | BC -2 | BC -3 | BC -4 | BC -5 | BC -6 | BC -7 | BC -8 | BC -9 | BC- 10 | BC- 11 | BC- 12 |
| 19 | HU300 | Introduction to Education | 2 | | | | | | | | | | | | Х |
| | | MKKF | | | | | | | | | | | | | - |
| 20 | MA100 | STEM | 3 | Х | | | | | | Χ | Х | | | | |
| 21 | MA200 | STEM Application | 3 | Χ | | | | | | Χ | Х | | | | |
| | | MKKIPS | | | | | | | | | | | | | |
| 22 | KI100 | Mathematics for Chemistry | 2 | Χ | | | | | | | | | | | |
| 23 | KI101 | Fundamentals of Chemistry 1 | 3 | Х | | | | | | | | | | | |
| 24 | KI102 | Fundamentals of Chemistry 2 | 3 | Χ | | | | | | | | | | | |
| 25 | KI200 | English | 2 | | | | | | | | | Χ | | | |
| 26 | KI201 | Entrepreneurship | 2 | | | | | | Χ | | | | | | |
| 27 | KI202 | Basic Laboratory Skills | 2 | | | | Χ | | | | | | | Х | |
| 28 | KI203 | Fundamental Chemistry Experiments | 2 | | | | Χ | | | | | | | Х | |
| 29 | KI303 | Chemical Bonding and Structure | 3 | | Х | | | | | | | | | | |
| 30 | KI304 | Gas, Thermodynamics and Phase Equilibrium | 3 | | Х | | | | | | | | | | |
| 31 | KI305 | Fundamentals of Analytical Chemistry | 3 | | Х | | | | | | | | | | |
| 32 | KI306 | Structure and Reactivity of Monofunctional Organic Compounds | 4 | | Х | | | | | | | | | | |
| 33 | KI307 | Structure and Reactivity of Inorganic Compounds | 3 | | Х | | | | | | | | | | |
| 34 | KI308 | Structure and Function of Biomolecule | 3 | | Х | | | | | | | | | | |
| 35 | KI309 | Chemical Kinetics | 2 | | Х | | | | | | | | | | |
| 36 | KI310 | Separation Chemistry | 2 | | Х | | | | | | | | | | |
| 37 | KI311 | Structure and Reactivity of Polyfunctional Organic Compounds | 2 | | Χ | | | | | | | | | | |
| 38 | KI312 | Chemistry of Transition and Main Group Elements | 3 | | Χ | | | | | | | | | | |
| 39 | KI313 | Biomolecule Metabolism and Genetic Information | 2 | | Χ | | | | | | | | | | |

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|----|-------|---|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BC -1 | BC -2 | BC -3 | BC -4 | BC -5 | BC -6 | BC -7 | BC -8 | BC -9 | BC- 10 | BC- 11 | BC- 12 |
| 40 | KI314 | Thermodynamics of Multi-components System | 2 | _ | X | | | | | | | | | | |
| 41 | KI315 | Organic Synthesis | 2 | | Х | | | | | | | | | | |
| 42 | KI316 | Coordination Chemistry | 3 | | Х | | | | | | | | | | |
| 43 | KI317 | Natural Product Chemistry | 2 | | Х | | | | | | | | | | |
| 44 | KI318 | Organometallic Chemistry | 2 | | Х | | | | | | | | | | |
| 45 | KI319 | Introduction to Environmental Chemistry | 2 | | | Х | | | | | | | | | |
| 46 | KI320 | Introduction to Food Chemistry | 2 | | | Х | | | | | | | | | |
| 47 | KI321 | Introduction to Material Chemistry | 2 | | | Х | | | | | | | | | |
| 48 | KI322 | Introduction to Biological Chemistry | 2 | | | Х | | | | | | | | | |
| 49 | KI323 | Nuclear Chemistry and Radiochemistry | 2 | | Х | | | | | | | | | | |
| 50 | KI324 | Computational Chemistry | 2 | | | Х | | Χ | | | | | | | |
| 51 | KI325 | Chemical Industry Process | 2 | | | | | | Х | | | | | | |
| 52 | KI337 | Statistics for Chemistry | 2 | Х | | | | Χ | | | | | | | |
| 53 | KI339 | Research Methodology | 2 | | | | | Χ | | Х | Χ | | | | |
| 54 | KI405 | Physical Chemistry Experiments | 2 | | | | Χ | | | | | | | Х | |
| 55 | KI406 | Fundamentals Analytical Chemistry Experiments | 2 | | | | Χ | | | | | | | Х | |
| 56 | KI407 | Identification and Purification of Organic Compounds Experiments | 2 | | | | Х | | | | | | | х | |
| 57 | KI408 | Inorganic Chemistry Experiments | 2 | | | | Χ | | | | | | | Х | |
| 58 | KI409 | Biochemistry Experiments | 2 | | | | Χ | | | | | | | Х | |
| 59 | KI410 | Chemical Separation and Measurement Experiments | 2 | | | | Χ | | | | | | | Х | |
| 60 | KI411 | Synthesis and Isolation of Organic Compounds Experiments | 2 | | | | Χ | | | | | | | Х | |
| 61 | KI503 | Instrumental Analytical Chemistry | 3 | | Х | | | | | | | | | | |
| 62 | KI504 | Elucidation of Organic and Inorganic Compounds Structure | 3 | | Х | | | | | | | | | | |

| | | | | | | | | | P | LO | | | | | |
|----|-------|--|-----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| No | Code | Courses | SKS | ВС | BC- | BC- | BC- |
| | | | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | 10 | 11 | 12 |
| 63 | KI505 | Polymer Chemistry | 2 | | Х | | | | | | | | | | |
| 64 | KI506 | Biotechnology | 2 | | Х | | | | | | | | | | |
| 65 | KI598 | Thesis | 6 | Х | Х | Х | Х | Χ | Х | Х | Х | Х | Х | Х | Х |
| 66 | KI599 | Defense Exam | 0 | Х | Х | Х | Х | Х | Х | Χ | Χ | Х | Χ | Χ | Х |
| | | MKKPPS | | | | _ | | | | | | | | | |
| 67 | KI507 | Water Treatment | 3 | | | Х | | | | | | | | | |
| 68 | KI508 | Waste Treatment | 3 | | | Х | | | | | | | | | |
| 69 | KI509 | System and Design of Waste Treatment | 2 | | | Х | | | | | | | | | |
| 70 | KI510 | Environmental Toxicology | 2 | | | Х | | | | | | | | | |
| 71 | KI511 | Environmental Chemistry Analysis | 2 | | | Х | | | | | | | | | |
| 72 | KI512 | Food Regulation | 2 | | | Х | | | | | | | | | |
| 73 | KI513 | Food Sensory Evaluation | 2 | | | Х | | | | | | | | | |
| 74 | KI514 | Food Chemistry | 2 | | | Χ | | | | | | | | | |
| 75 | KI515 | Food Preservation | 2 | | | Х | | | | | | | | | |
| 76 | KI516 | Food Processing | 2 | | | Х | | | | | | | | | |
| 77 | KI517 | Health and Nutrition | 2 | | | Х | | | | | | | | | |
| 78 | KI518 | Solid State Chemistry | 3 | | | Х | | | | | | | | | |
| 79 | KI519 | Selected Topic in Material Chemistry | 2 | | | Х | | | | | | | | | |
| 80 | KI520 | Surface Chemistry | 3 | | | Х | | | | | | | | | |
| 81 | KI521 | Chemistry and Nanotechnology | 3 | | | Х | | | | | | | | | |
| 82 | KI522 | Essential Oil Chemistry | 3 | | | Х | | | | | | | | | |
| 83 | KI523 | Separation and Characterization of Natural Product Compounds | 3 | | | Х | | | | | | | | | |
| 84 | KI524 | Molecular Genetics | 3 | | | Х | | | | | | | | | |

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|----|-------|--|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BC -1 | BC -2 | BC -3 | BC -4 | BC -5 | BC -6 | BC -7 | BC -8 | BC -9 | BC- 10 | BC- 11 | BC- 12 |
| 85 | KI525 | Selected Topic in Biological Chemistry | 3 | _ | | Х | • | | | | | | | | |
| 86 | KI527 | Waste and Water Treatment Experiments | 2 | | | | Χ | | | Χ | | | | Х | |
| 87 | KI526 | Biological Chemistry Research Techniques | 2 | | | Χ | | | | | | | | | |
| 88 | KI528 | Food Processing and Technology Experiments | 2 | | | | Χ | | | Χ | | | | Х | |
| 89 | KI529 | Material Synthesis and Characterization | 3 | | | Х | | | | | | | | | |
| 90 | KI530 | Environmental Chemistry Seminar | 2 | | | | | | | Х | Х | Χ | | | |
| 91 | KI531 | Food Chemistry Seminar | 2 | | | | | | | Х | Х | Χ | | | |
| 92 | KI532 | Material Chemistry Seminar | 2 | | | | | | | Х | Χ | Χ | | | |
| 93 | KI533 | Biological Chemistry Seminar | 2 | | | | | | | Χ | Х | Χ | | | |
| | | MKPPL | | | | | | | | | | | | | |
| 94 | KI590 | Working Practice Interval (Internship) | 4 | Х | Χ | Х | Х | Χ | Χ | Χ | Х | Χ | Х | Х | Х |
| | | Jumlah SKS | 147 | | | | | | | | | | | | |

2. Mapping Between PLOs with courses in Bachelor of Physics

| | | | | | | | | | PL | .0 | | | | | |
|----|-------|---|-----|----|----|----------|----|----|----|----|----------|----------|-----|-----|-----|
| No | Code | Courses | SKS | ВР | ВР | BP -3 | ВР | ВР | ВР | BP | BP -8 | BP -9 | BP | BP | BP |
| | | | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 |
| | | МКИ | | | | I | I | I | | | | | | | |
| 1 | KU100 | Islamic Education | 2 | | | | | | | | | | | Х | |
| 2 | KU101 | Protestant Christianity Education | 2 | | | | | | | | | | | Χ | |
| 3 | KU102 | Catholic Education | 2 | | | | | | | | | | | Χ | |
| 4 | KU103 | Hinduism Education | 2 | | | | | | | | | | | Х | |
| 5 | KU104 | Buddhism Education | 2 | | | | | | | | | | | Х | |
| 6 | KU109 | Confucianism Education | 2 | | | | | | | | | | | Х | |
| 7 | KU105 | Civic Education | 2 | | | | | | | | | | | Х | |
| 8 | KU106 | Indonesian Languange | 2 | | | | | | | | | | | Х | |
| 9 | KU108 | Sports Education | 2 | | | | | | | | | | | | Х |
| 10 | KU110 | Pancasila Education | 2 | | | | | | | | | | | Х | |
| 11 | KU119 | Art Education | 2 | | | | | | | | | | | Χ | |
| 12 | KU300 | Islamic Education Seminar | 2 | | | | | | | | | | | Х | |
| 13 | KU301 | Protestant Christianity Education Seminar | 2 | | | | | | | | | | | Х | |
| 14 | KU302 | Catholic Education Seminar | 2 | | | | | | | | | | | Х | |
| 15 | KU303 | Hinduism Education Seminar | 2 | | | | | | | | | | | Х | |
| 16 | KU304 | Buddhism Education Seminar | 2 | | | | | | | | | | | Х | |
| 17 | KU309 | Confucianism Education Seminar | 2 | | | | | | | | | | | Х | |
| 18 | KU400 | Community Service | 2 | | | | | | | | | | | Χ | Х |
| | | мкки | | | | • | • | - | | | | | | | |
| 19 | HU300 | Introduction to Education | 2 | | Χ | | | | | | | | | | |

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|----|-------|---|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BP -1 | BP -2 | BP -3 | BP -4 | BP -5 | BP -6 | BP -7 | BP -8 | BP -9 | BP -10 | BP -11 | BP -12 |
| | | МККЕ | | | | | | | | | | | | | |
| 20 | MA100 | STEM | 3 | Х | Χ | Х | Х | Х | Χ | Х | Χ | | | | |
| 21 | MA200 | STEM Application | 3 | Х | Х | Χ | Χ | Χ | Χ | Χ | Χ | | | | |
| | | MKKIPS | | | | | | | | | | | | | |
| 22 | FI120 | Fundamentals of Mathematics | 3 | | Χ | | | | | | | | | | |
| 23 | FI121 | Fundamentals of Physics 1 | 4 | Χ | | | | | | | | | | | |
| 24 | FI122 | Fundamentals of Physics 2 | 4 | Χ | | | | | | | | | | | |
| 25 | FI140 | Fundamental Concepts of Earth and Space | 3 | Χ | | | | | | | | | | | |
| 26 | FI220 | English | 2 | | Χ | | | | | | | | | | Х |
| 27 | FI221 | Entrepreneurship | 2 | | | | | | | | | | | | |
| 28 | FI222 | Mathematical Physics 1 | 4 | | Χ | | | | | | | | | | |
| 29 | FI223 | Fundamentals Physics Experiments 1 | 2 | Χ | | | Χ | | | | | | | | |
| 30 | FI224 | Fundamentals Physics Experiments 2 | 2 | Х | | | Χ | | | | | | | | |
| 31 | F1240 | Mathematical Physics 2 | 4 | | Χ | | | | | | | | | | |
| 32 | FI241 | Analog Electronics | 3 | Χ | | | | | | | | | | | |
| 33 | FI242 | Algorithm and Programming | 3 | | Χ | | | Χ | | | | | | | |
| 34 | FI340 | Classical Mechanics | 4 | Χ | | | | | | | | | | | |
| 35 | FI341 | Thermodynamics | 3 | Х | | | | | | | | | | | |
| 36 | FI342 | Optics | 2 | Χ | | | | | | | | | | | |
| 37 | FI343 | Fluid Physics | 2 | Χ | | | | | | | | | | | |
| 38 | FI344 | Electromagnetism | 4 | Χ | | | | | | | | | | | |
| 39 | FI345 | Wave | 4 | Χ | | | | | | | | | | | |

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|----|-------|---|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BP -1 | BP -2 | BP -3 | BP -4 | BP -5 | BP -6 | BP -7 | BP -8 | BP -9 | BP -10 | BP -11 | BP -12 |
| 40 | FI360 | Modern Physics | 4 | Х | | | | | | | | | | | |
| 41 | FI381 | History of Physics | 2 | Х | | | | | | | | | | | |
| 42 | FI441 | Digital Electronics | 3 | Х | | | | | | | | | | | |
| 43 | FI460 | Wave and Electromagnetism Experiments | 2 | Х | | | Χ | | | | | | | | |
| 44 | FI461 | Computational Physics | 4 | | Х | | | Х | | | | | | | |
| 45 | FI462 | Modern Physics Experiments | 2 | Х | | | Χ | | | | | | | | |
| 46 | FI481 | Physical Modeling and Simulation | 3 | | Χ | | | Χ | | | | | | | |
| 47 | FI560 | Quantum Physics | 4 | Х | | | | | | | | | | | |
| 48 | FI561 | Solid State Physics | 4 | Х | | | | | | | | Х | Χ | | |
| 49 | FI562 | Nuclear Physics | 4 | Х | | | | | | | | | | | |
| 50 | FI563 | Research Methodology and Scientific Publication | 3 | | | Χ | | | Χ | | | | | | |
| 51 | FI580 | Statistical Physics | 3 | Х | | | | | | | | | | | |
| 52 | FI581 | Physics Seminar | 3 | | | Х | | | Χ | | | Χ | Χ | | Х |
| 53 | FI598 | Thesis | 6 | Х | Х | Х | Χ | Х | Χ | Χ | Х | Х | Χ | Х | Х |
| 54 | FI599 | Defense exam | 0 | Х | Χ | Χ | Χ | Χ | Χ | Χ | Χ | Χ | Χ | Χ | Х |
| | | MKPPS | | | | | | | | | | | | | |
| 53 | FI346 | Physics of Volcanoes | 2 | Х | | | | | | | | | | | |
| 54 | FI347 | Information and Communication Technology | 2 | | Χ | | | Χ | | | | | | | |
| 55 | FI348 | Electrical Circuit Analysis | 2 | Х | | | | | | | | | | | |
| 56 | FI349 | Control and Automation | 2 | Х | Χ | | | | | | | | | | |
| 57 | FI361 | Geophysical Geology | 3 | Х | | | | | | | | | | | |
| 58 | FI362 | Space Physics | 3 | Х | | | | | | | | | | | |

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|----|-------|--|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| No | Code | Courses | SKS | BP -1 | BP -2 | BP -3 | BP -4 | BP -5 | BP -6 | BP -7 | BP -8 | BP -9 | BP -10 | BP -11 | BP -12 |
| 59 | FI363 | Material Physics | 3 | Х | | | | | | | | | | | |
| 60 | F1364 | Metrology and Calibration | 3 | Х | | | | | | | | | | | |
| 61 | FI501 | Celestial Mechanics | 2 | Х | | | | | | | | | | | |
| 62 | FI502 | Industrial Instrumentation | 2 | Х | | | | | | | | | | | |
| 63 | FI503 | Geomechanics of Rocks and Soils | 2 | Х | | | | | | | | | | | |
| 64 | FI504 | Superconductor | 2 | Х | | | | | | | | | | | |
| 65 | F1505 | Space Weather and Meteorology | 2 | Х | | | | | | | | | | | |
| 66 | FI564 | Geophysical Exploration | 3 | Х | | | | | | | | | | | |
| 67 | FI565 | Astrophysics | 3 | Х | | | | | | | | | | | |
| 68 | FI566 | Physics of Semiconductor Device | 3 | Х | | | | | | | | | | | |
| 69 | FI567 | Instrumentation System | 3 | Х | | | | | | | | | | | |
| 70 | FI582 | Geophysical Data Analysis | 3 | Х | | | Х | | | | | | | | |
| 71 | FI583 | Geothermal Physics | 2 | Х | | | | | | | | | | | |
| 72 | FI584 | Astronomical Position | 2 | Х | | | | | | | | | | | |
| 73 | FI585 | Stellar Physics | 3 | Х | | | | | | | | | | | |
| 74 | FI586 | Nanomaterial | 2 | Х | | | | | | | | | | | |
| 75 | FI587 | Processing and Characterization of Semiconductor Material | 3 | Х | | | | | | | | | | | |
| 76 | FI588 | Intelligent Instrumentation | 2 | Х | Х | | | | | | | | | | |
| 77 | FI589 | Microprocessor Application | 3 | Х | Х | | | | | | | | | | |
| 78 | FI598 | Thesis | 6 | Х | Х | Х | Х | Х | Χ | Χ | Χ | Χ | Χ | Χ | Χ |
| | | MKPPLSP | | | | | | | | | | | | | |
| 79 | FI591 | Working Practice Interval | 4 | Х | Χ | Х | Х | Χ | Χ | Χ | Χ | Χ | Χ | Χ | Χ |

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|---|----|------|------------|-----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| | No | Code | Courses | SKS | ВР | ВР | ВР |
| | | | | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 |
| Г | | | Jumlah SKS | 145 | | | | | | | | | | | | |

3. Mapping Between PLOs with courses in Bachelor of Chemistry Education

| | | | | | | | | | | PI | .0 | | | | | | |
|----|-------|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| No | Code | Courses | SKS | BCE | BCE | BCE | BCE | BCE | ВСЕ | BCE |
| | | MKU | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13 | -14 |
| 1 | KU100 | Islamic Education | 2 | | | | | | | | | | | | | Х | Х |
| 2 | KU101 | Protestant Christianity Education | 2 | | | | | | | | | | | | | Х | Х |
| 3 | KU102 | Catholic Education | 2 | | | | | | | | | | | | | Х | Х |
| 4 | KU103 | Hinduism Education | 2 | | | | | | | | | | | | | Х | Х |
| 5 | KU104 | Buddhism Education | 2 | | | | | | | | | | | | | Х | Х |
| 6 | KU109 | Confucianism Education | 2 | | | | | | | | | | | | | Х | Х |
| 7 | KU105 | Civic Education | 2 | | | | | | | | | | | | | | Х |
| 8 | KU106 | Indonesian Languange | 2 | | | | | | | | | | | Х | | | |
| 9 | KU108 | Sports Education | 2 | | | | | | | | | | | | | | Х |
| 10 | KU110 | Pancasila Education | 2 | | | | | | | | | | | | | | Х |
| 11 | KU119 | Art Education | 2 | | | | | | | | | | | | | | Х |
| 12 | KU300 | Islamic Education Seminar | 2 | | | | | | | | | | | | | | Х |
| 13 | KU301 | Protestant Christianity Education Seminar | 2 | | | | | | | | | | | | | | х |
| 14 | KU302 | Catholic Education Seminar | 2 | | | | | | | | | | | | | | Х |
| 15 | KU303 | Hinduism Education Seminar | 2 | | | | | | | | | | | | | | Х |
| 16 | KU304 | Buddhism Education Seminar | 2 | | | | | | | | | | | | | | Х |
| 17 | KU309 | Confucianism Education Seminar | 2 | | | | | | | | | | | | | | Х |
| 18 | KU400 | Community Service | 2 | | | | | | | | | | | | | Х | |
| | | MKDK | | | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | | |
| 19 | DK300 | Fundamentals of Education | 2 | | | | | | Х | | | | Х | | | | |

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|----|-----------|---|-----|-----|-----|-----|-----|-----|-------|--------|----------|---------|-----|-----|-----|-----|-----|
| No | Code | Courses | SKS | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE | BCE |
| | | Psychology of Education and | | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13 | -14 |
| 20 | DK301 | Counseling | 2 | | | | | | Х | | | | Х | | | | |
| 21 | DK303 | Curriculum and Learning | 2 | | | | | | Х | | | | Х | | | | |
| 22 | DK304 | Education Management | 2 | | | | | | Х | | | | Х | | | | |
| | | MKKF | | | | | • | | Funda | mental | s of Edu | ıcation | • | | | | |
| 23 | MA10 0 | STEM | 3 | Х | | | | | | | | | Х | | | | |
| 24 | MA20 0 | STEM Application | 3 | Х | | | | | | | | | Х | | | | |
| | | MKPBS | | | | | | | | | | | | | | | |
| 25 | KI326 | Chemistry Learning Strategy | 3 | | | | | | | Х | | | Х | | | | |
| 26 | KI327 | Chemistry Learning Evaluation | 3 | | | | | | | Х | | | Х | | | | |
| 27 | KI328 | Chemistry Learning Media and ICT Literation | 3 | | | | | | | Х | | | Х | | | | |
| 28 | KI329 | Chemistry Learning Planning | 3 | | | | | | | Х | | | Х | | | | |
| | | MKKIPS | | | | | | | | | | | | | | | |
| 29 | KI100 | Mathematics for Chemistry | 2 | Х | | | | | | | | | Х | | | | |
| 30 | KI101 | Fundamentals of Chemistry 1 | 3 | | | | | | | | | | Х | | | | |
| 31 | KI102 | Fundamentals of Chemistry 2 | 3 | | | | | | | | | | Х | | | | |
| 32 | KI200 | English | 2 | | | | | | | | | | Χ | Х | | | |
| 33 | KI201 | Entrepreneurship | 2 | | | | | | | | | | Х | | | Х | |
| 34 | KI202 | Basic Laboratory Skills | 2 | | | | Х | | | | | | Х | | | | |
| 35 | KI203 | Fundamental Chemistry Experiments | 2 | | | | Х | | | | | | х | | | | |
| 36 | KI301 | School Chemistry 1 | 3 | | | | | | | Х | | | Х | | | | |
| 37 | KI302 | School Chemistry 2 | 3 | | | | | | | Х | | | Х | | | | |

| | | | SKS BCE | | | | | | | | | | | | | | |
|----|-------|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| No | Code | Courses | SKS | BCE -1 | BCE -2 | BCE -3 | BCE -4 | BCE -5 | BCE -6 | BCE -7 | BCE -8 | BCE -9 | BCE -10 | BCE -11 | BCE -12 | BCE -13 | BCE -14 |
| 38 | KI303 | Chemical Structure and Bonding | 3 | -1 | X | -3 | -4 | -5 | -0 | -/ | -0 | -9 | -10 X | -11 | -12 | -13 | -14 |
| 39 | KI304 | Gas, Thermodynamics and Phase Equilibrium | 3 | | Х | | | | | | | | Х | | | | |
| 40 | KI305 | Fundamentals of Analytical Chemistry | 3 | | х | | | | | | | | х | | | | |
| 41 | KI306 | Structure and Reactivity of Monofunctional Organic Compounds | 4 | | х | | | | | | | | х | | | | |
| 42 | KI307 | Structure and Reactivity of Inorganic Compounds | 3 | | Х | | | | | | | | Х | | | | |
| 43 | KI308 | Structure and Function of Biomolecule | 3 | | х | | | | | | | | х | | | | |
| 44 | KI309 | Chemical Kinetics | 2 | | Х | | | | | | | | Х | | | | |
| 45 | KI310 | Separation Chemistry | 2 | | Х | | | | | | | | Х | | | | |
| 46 | KI311 | Structure and Reactivity of Polyfunctional Organic Compounds | 2 | | х | | | | | | | | х | | | | |
| 47 | KI312 | Chemistry of Transition and Main Groups Elements | 3 | | х | | | | | | | | х | | | | |
| 48 | KI313 | Biomolecule Metabolism and Genetic Information | 2 | | х | | | | | | | | х | | | | |
| 49 | KI314 | Thermodynamics of Multi- components System | 2 | | Х | | | | | | | | х | | | | |
| 50 | KI316 | Coordination Chemistry | 3 | | Х | | | | | | | | Х | | | | |
| 51 | KI336 | Statistics for Chemistry Education Research | 2 | | | | | | | | Х | х | х | | | | |
| 52 | KI338 | Chemistry Education Research Methodology | 3 | | | | | | | | Х | Х | Х | | | | |
| 53 | KI401 | Multimedia Programming | 2 | | | | | | | | | | Х | | | | |
| 54 | KI405 | Physical Chemistry Experiment | 2 | | | | Х | | | | | | Х | | | | |

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|----|-------|--|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| No | Code | Courses | SKS | BCE -1 | BCE -2 | BCE -3 | BCE -4 | BCE -5 | BCE -6 | BCE -7 | BCE -8 | BCE -9 | BCE -10 | BCE -11 | BCE -12 | BCE -13 | BCE -14 |
| 55 | KI406 | Fundamental Analytical Chemistry Experiment | 2 | • | _ | 3 | Х | | | , | | | Х | -11 | 12 | 13 | 14 |
| 56 | KI407 | Identification and Purification of Organic Compounds Experiments | 2 | | | | Х | Х | | | | | Х | | | | |
| 57 | KI408 | Inorganic Chemistry Experiments | 2 | | | | Х | Х | | | | | Х | | | | |
| 58 | KI409 | Biochemistry Experiments | 2 | | | | Х | Х | | | | | Х | | | | |
| 59 | KI410 | Chemical Separation and Measurement Experiments | 2 | | | Х | | | | | | | х | | | | |
| 60 | KI411 | Synthesis and Isolation of Organic Compounds Experiments | 2 | | | | х | х | | | | | х | | | | |
| 61 | KI501 | Chemistry Learning Simulation | 3 | | | | | | | Х | | | Х | | | | |
| 62 | KI503 | Instrumental Analytical Chemistry | 3 | | Х | | | | | | | | Х | | | | |
| 63 | KI598 | Thesis | 6 | Χ | Х | Χ | Х | Х | Х | Х | Χ | Х | Х | Χ | Χ | Х | Χ |
| 64 | KI599 | Defense Exam | 0 | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Χ | Х | Х | Х |
| | | MKKPPS | | | | | | | | | | | | | | | |
| 65 | KI319 | Introduction to Environmental Chemistry | 2 | | | х | | | | | | | х | | | | |
| 66 | KI320 | Introduction to Food Chemistry | 2 | | | Х | | | | | | | Х | | | | |
| 67 | KI321 | Introduction to Material Chemistry | 2 | | | Х | | | | | | | Х | | | | |
| 68 | KI322 | Introduction to Biological Chemistry | 2 | | | Х | | | | | | | Х | | | | |
| 69 | KI323 | Nuclear Chemistry and Radiochemistry | 2 | | | Х | | | | | | | Х | | | | |
| 70 | KI325 | Chemical Industry Process | 2 | | | Х | | | | | | | Х | | | | |
| 71 | KI330 | Philosophy of Science and History of Chemistry | 2 | Х | | | | | | | | | Х | | | | |

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|----|-------|--|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| No | Code | Courses | SKS | BCE -1 | BCE -2 | BCE -3 | BCE -4 | BCE -5 | BCE -6 | BCE -7 | BCE -8 | BCE -9 | BCE -10 | BCE -11 | BCE -12 | BCE -13 | BCE -14 |
| 72 | KI331 | School Chemistry Laboratory Management | 2 | | | | Х | | | | | | х | | | | |
| 73 | KI332 | Junior and Senior High School Chemistry Learning and Curriculum | 2 | | | | | | | Х | | | Х | | | | |
| 74 | KI334 | Management of School Chemistry Teaching Material | 2 | | | | | | | Х | | | Х | | | | |
| 75 | KI335 | Training Management in Chemistry Education | 2 | | | | | | | | | | Х | | | | |
| 76 | KI402 | School Chemistry Experiment | 2 | | | | Х | | | | | | Х | | | | |
| 77 | KI403 | Production of Web Based Chemistry Teaching Material | 2 | | | | | | | Х | | | Х | | | | |
| 78 | KI404 | Production of Chemistry Learning Videos | 2 | | | | | | | | | | Х | | | | |
| 79 | KI502 | Development of School Chemistry Experiments | 2 | | | | Х | Х | | | | | Х | | | | |
| | | MKPPLSP | | | | | | | | | | | | | | | _ |
| 80 | KI590 | Working Practice Interval | 4 | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| | | Jumlah SKS | 150 | | | | | | | | | | | | | | |

4. Mapping Between PLOs with courses in Bachelor of Physics Education

| | | | | | | | | | | LO | | | | | | |
|----|-------|---|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| No | Code | Courses | SKS | BPE- |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | | МКИ | | | I | I | | | | I | 1 | | | | | |
| 1 | KU100 | Islamic Education | 2 | | | | | | | | | | | | Х | Х |
| 2 | KU101 | Protestant Christianity Education | 2 | | | | | | | | | | | | Х | Х |
| 3 | KU102 | Catholic Christianity Education | 2 | | | | | | | | | | | | Χ | Χ |
| 4 | KU103 | Hinduism Education | 2 | | | | | | | | | | | | Χ | Χ |
| 5 | KU104 | Buddhism Education | 2 | | | | | | | | | | | | Χ | Х |
| 6 | KU109 | Confucianism Education | 2 | | | | | | | | | | | | Χ | Χ |
| 7 | KU105 | Civic Education | 2 | | | | | | | | | | | | Х | Χ |
| 8 | KU106 | Indonesian Language | 2 | | | | | | | | | | | | Х | Х |
| 9 | KU110 | Pancasila Education | 2 | | | | | | | | | | | | Х | Х |
| 10 | KU108 | Physical Education and Sport | 2 | | | | | | | | | | | | Х | Х |
| 11 | KU119 | Art Education | 2 | | | | | | | | | | | | Х | Х |
| 12 | KU300 | Islamic Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 13 | KU301 | Protestant Christianity Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 14 | KU302 | Catholic Christianity Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 15 | KU303 | Hinduism Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 16 | KU304 | Buddhism Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 17 | KU309 | Confucianism Education Seminar | 2 | | | | | | | | | | | | Х | Х |
| 18 | KU400 | Community Service | 2 | | | | | | | | | | | | Х | Х |
| | | МКДК | | | • | • | • | • | | • | • | | | | | |
| 19 | DK300 | Fundamentals of Education | 2 | | | | | | Х | | Х | Х | | | | |
| 20 | DK301 | Psychology of Education and Counselling | 2 | | | | | | Х | | Х | Х | | | | |
| 21 | DK303 | Curriculum and Learning | 2 | | | | | | Х | | Х | Х | | | | |
| 22 | DK304 | Management of Education | 2 | | | | | | Х | | Х | Х | | | | |
| | | MKKF | | | | | | | | | | | | | | |

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|----|-------|---|-----|------|-----------|------|------|------|------|------|------|------|------|------|------|------|
| No | Code | Courses | SKS | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- | BPE- |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 23 | MA100 | Mathematics, Science, Technology, and Engineering | 3 | Х | | | | | | Х | Х | | | | | |
| 24 | MA200 | Applied Mathematics, Science, Technology, and Engineering | 3 | Х | | | | | | Х | Х | | | | | |
| | | MKKPBS | | | | | | | | | | | | | | |
| 25 | FI251 | Strategy of Physics Learning | 3 | | | | | Х | Х | Х | Х | Х | | | Х | Х |
| 26 | FI252 | Media and ICT Literacy in Physics Learning | 3 | | | | | Х | Х | Х | Х | Х | | | Х | Х |
| 27 | FI253 | Lesson Plan in Physics Learning | 3 | | | | | Х | Х | Х | Х | Х | | | Х | Х |
| 28 | FI551 | Evaluation in Physics Learning | 3 | | | | | Х | Х | Х | Х | Х | | | Х | Х |
| | | MKKIPS | | | | | | | | | | | | | | |
| 29 | FI111 | Calculus | 3 | | Х | | | | | | | Х | | | | Х |
| 30 | FI112 | Fundamentals of Physics I | 4 | | Х | | | | | | | Х | | | | Х |
| 31 | FI211 | Experiment on Fundamental of Physics I | 2 | | Х | | | | | | | Х | | | | Х |
| 32 | FI113 | Fundamentals of Physics II | 4 | | Х | | | | | | | Х | | | | Х |
| 33 | FI212 | Experiments on Fundamental of Physics II | 2 | | Х | | | | | | | Х | | | | Х |
| 34 | FI213 | English | 2 | | Х | | Х | | | | | | | | | |
| 35 | FI311 | Mathematical Physics I | 4 | Х | Х | | | | | | | | | | | |
| 36 | FI131 | Statistics | 2 | Χ | | | | | | | | Х | | | | |
| 37 | FI132 | Earth and Space Science | 3 | Х | Х | | | | | | | Х | | | | Х |
| 38 | FI331 | Mathematical Physics II | 4 | Х | Х | | | | | | | | | | | |
| 39 | FI332 | Mechanics for School | 2 | | Х | Х | | | Х | | | Х | | | | Х |
| 40 | FI333 | Electronics | 3 | Х | Х | | | | | | | | | | | Х |
| 41 | FI334 | Thermodynamics and Optical Waves for Schools | 2 | | Х | Х | | | Х | | | Х | | | | Х |
| 42 | FI335 | Mechanics | 4 | Х | Х | | | | | | | | | | | |
| 43 | FI336 | Thermodynamics | 3 | | Х | | | | | | | Х | | | | Х |
| 44 | FI337 | Wave and Optics | 4 | | $\sqrt{}$ | | | | | | | | | | | |

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|----|-------|--|-----|------|------|------|------|------|------|------|------|------|------------|------|------|------|
| No | Code | Courses | SKS | BPE- | BPE- 10 | BPE- | BPE- | BPE- |
| 45 | FI254 | School Physics Laboratory | 2 | - | X | Х | X | | J | | | | 10 | | | X |
| 46 | FI351 | Electromagnetism and Modern Physics for School | 2 | х | х | | | | | | | х | | | | Х |
| 47 | FI352 | Electromagnetism | 4 | Х | Х | | | | | | | Х | | | | Х |
| 48 | FI353 | Modern Physics | 4 | | Х | | | | | | | Х | | | | |
| 49 | FI552 | Seminar of Physics Education | 3 | | | Х | Х | Х | | Х | Х | Х | | | | Х |
| 50 | FI553 | Research Methodology of Physics Education | 3 | | | | Х | Х | Х | Х | Х | Х | | | | Х |
| 51 | FI554 | Nuclear Physics | 3 | Х | Х | | | | | | | | | | | |
| 52 | FI371 | Entrepreneurship | 2 | Х | | | | | | | | | | | | Х |
| 53 | FI571 | Quantum Physics | 3 | | Х | | | | | | | | | | | Х |
| 54 | FI572 | Statistical Physics | 3 | | Х | | | | | | | Х | | | | Х |
| 55 | FI573 | Solid State Physics | 3 | | Х | | | | | | | Х | | | | Х |
| 56 | FI598 | Thesis | 6 | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| 57 | FI599 | Thesis Defence | 0 | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| | | МККРРЅ | | | | | | | | | | | | | | |
| 58 | FI133 | Physics for Elementary School | 2 | | Х | | | | Х | | | Х | | | | Х |
| 59 | FI338 | Environmental Physics | 2 | | Х | | | | | | | | | | | Х |
| 60 | FI339 | Taxonomy of Physics Education | 2 | | | Х | | | | Х | Х | | | | | Х |
| 61 | FI431 | Technology and Engineering is Physics Education | 2 | | | Х | | | | Х | Х | | | | | Х |
| 62 | FI432 | E-Learning in Physics Education | 2 | | | Х | | | | Х | Х | | | | | Х |
| 63 | FI433 | ICT in Physics Learning | 2 | | | Х | | | | Х | Х | | | | | Х |
| 64 | FI434 | Applied Statistics for Education | 2 | Х | | | | | | | | | | | | Х |
| 65 | FI435 | Applied Electronics | 2 | | Х | | | | | | | | | | | Х |
| 66 | FI436 | Computational Physics | 2 | Х | | | | | | | | | | | | |
| 67 | FI531 | Item Response Theory | 2 | Х | | Х | | | | | | Х | | | | Х |
| 68 | FI354 | Innovation of Physics Teaching Material | 2 | | | Х | | | | | | Х | | | | Х |

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|----|-------|--|-----|------|------|------|------|-----------|------|------|------|-----------|------------|------------|------------|------------|
| No | Code | Courses | SKS | BPE- | BPE- | BPE- | BPE- | BPE- 5 | BPE- | BPE- | BPE- | BPE- 9 | BPE- 10 | BPE- 11 | BPE- 12 | BPE- 13 |
| 69 | FI355 | History of Physics | 2 | | Х | | | | | | | | | | | |
| 70 | FI451 | Wave and Electromagnetism Experiments *) | 2 | | Х | | Х | | | | | | | | | Х |
| 71 | FI452 | Electronic Instrumentation and Measurement Technique | 2 | | Х | | | | | | | Х | | | | Х |
| 72 | FI574 | Physics Education for Sustainable Development | 2 | | Х | | | | Х | | | Х | | | | Х |
| 73 | FI471 | Management of School Physics Laboratory *) | 2 | | | Х | | | | | | | | | | Х |
| 74 | FI472 | Experiments on Modern Physics | 2 | Х | Х | | Х | | | Х | | | | | | Х |
| 75 | FI575 | Advance Nuclear Physics | 2 | Х | Х | | | | | | | Х | | | | |
| 76 | FI576 | Advance Quantum Physics | 2 | Х | Х | | | | | | | Х | | | | |
| 77 | FI577 | Advance Solid-State Physics | 2 | | Х | | | | | | | | | | | |
| 78 | FI578 | Astrophysics | 2 | | Х | | | | | | | Х | | | | Х |
| | | MKPPL | | | | | | | | | | | | | | |
| 79 | FI590 | Teaching Practice In School | 4 | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| | | Jumlah SKS | 146 | | | | | | | | | | | | | |

5. Mapping Between PLOs with courses in Master of Chemistry

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|----|-------|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| No | Code | Courses | SKS | MC- |
| | | MKKPs | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | PS701 | Applied Statistics | 3 | | | Х | | | | | |
| 2 | PS702 | Philosophy of Science | 2 | | | | | Х | Х | | |
| 3 | PS709 | Chemistry Research Methodology | 3 | | | | Х | Х | Х | Х | |
| | | MKKIPS | | | | | | | | | |
| 4 | KI707 | Selected Topics in Physical Chemistry | 2 | Х | | | | | | | |
| 5 | KI711 | Selected Topics in Organic Chemistry | 2 | Х | | | | | | | |
| 6 | KI712 | Selected Topics in Analytical Chemistry | 2 | Х | | | | | | | |
| 7 | KI713 | Selected Topics in Inorganic Chemistry | 2 | Х | | | | | | | |
| 8 | KI723 | Selected Topics in Biochemistry | 2 | Х | | | | | | | |
| 9 | KI724 | Computational Chemistry | 2 | | Х | Х | | | | | |
| 10 | KI725 | Characterization and Measurement in Chemistry | 2 | Х | | | | | | | |
| 11 | KI799 | Thesis | 8 | | | Х | Х | | | Х | |
| | | МККРРЅ | | | | | • | | | | |
| 12 | KI726 | Material Design and Process | 2 | Х | Х | | | | | | |
| 13 | KI727 | Polymer Material | 2 | Х | Х | | | | | | |
| 14 | KI728 | Composite and Ceramic Materials | 3 | Х | Х | | | | | | |
| 15 | KI729 | Material Synthesis and Characterization | 3 | Х | Х | | | | | | |
| 16 | KI730 | Material Chemistry Research Study | 2 | Х | Х | | Х | | | | Х |
| 17 | KI731 | Functional Food Components | 2 | Х | Х | | | | | | |
| 18 | KI732 | Drug Molecule Synthesis | 2 | Х | Х | | | | | | |
| 19 | KI733 | Molecular Mechanism and Drug Biotransformation | 2 | Х | Х | | | | | | |

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|----|-------|--------------------------------------|-----|----------|----------|-----|----------|----------|----------|----------|----------|
| No | Code | Courses | SKS | MC- 1 | MC- 2 | MC- | MC- 4 | MC- 5 | MC- 6 | MC- 7 | MC- 8 |
| 20 | KI734 | Medical and Nutritional Biochemistry | 2 | Х | Х | | | | | | |
| 21 | KI735 | Biological Chemistry Research Study | 2 | Х | Х | | | Х | | | Х |
| 22 | KI736 | Food and Drug Analysis | 2 | Х | Х | | | | | | |
| | | Jumlah SKS | 42 | | | | | | | | |