

Doctor of Philosophy Program in Biomolecular Science and Engineering (International Program)**Doctor of Philosophy (Biomolecular Science and Engineering)**

5 Year

2.2: Research and Coursework (5-year program) BSE

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| Total Credits of the Program | No less than | 73 | Credit |
| Curriculum Structure | | | |
| 1) Core Courses | No less than | 25 | Credit |
| 1.1) Seminar | No less than | 4 | Credit |
| BSE 571 Seminar I (GD) | | | 1(0-0-0) |
| BSE 572 Seminar II (GD) | | | 1(0-0-0) |
| BSE 671 Seminar III (GD) | | | 1(0-0-0) |
| BSE 672 Seminar IV (GD) | | | 1(0-0-0) |
| 1.2) Professional Development | | 3 | Credit (non credit) |
| BSE 661 Professional Development (SU) | | | 3(3-0-6) |
| 1.3) Leadership in Science and Engineering | | 3 | Credit (non credit) |
| BSE 662 Leadership in Science and Engineering (SU) | | | 3(3-0-6) |
| 1.4) Compulsory Core Courses | | 12 | Credit |
| BSE 501 Fundamentals in Biomolecular Science (GD) | | | 3(3-0-6) |
| BSE 502 Fundamentals in Biological Engineering (GD) | | | 3(3-0-6) |
| BSE 503 Biophysical and Advanced Instrumental Principles (GD) | | | 3(3-0-6) |
| BSE 504 Design, Module and Invention in Biological Engineering (GD) | | | 3(3-0-6) |
| 1.5) Compulsory Elective Courses | No less than | 9 | Credit |
| 1.5.1) Frontiers in Biomolecular Science and Engineering) | | | |
| BSE 611 Synthetic and Systems Biology (GD) | | | 3(3-0-6) |
| BSE 612 Biocatalysis and Mechanistic Enzymology (GD) | | | 3(3-0-6) |
| BSE 613 Chemical Biology (GD) | | | 3(3-0-6) |
| BSE 614 Structural Biology: Protein Crystallography and Modelling (GD) | | | 3(1-2-3) |
| BSE 615 Frontiers in Biomolecular Science and Engineering (GD) | | | 3(3-0-6) |
| 1.5.2) Practical Laboratory Design for Effective Use of Biomolecules and Biological Systems in Industry | | | |
| BSE 521 Integrated Studies in Biomolecular Science and Engineering (GD) | | | 3(1-3-3) |
| BSE 522 Laboratory Management and Regulation in Biological Science (GD) | | | 3(3-0-6) |
| 1.5.3) Applications of Biomolecules and Biological Systems in Innovation | | | |
| BSE 642 Biosensor and Electrochemistry (GD) | | | 3(3-0-6) |
| BSE 643 Process Design for Sustainable Engineering (GD) | | | 3(3-0-6) |
| 1.5.4) Courses Offered by Other Schools | | | |
| CHE 501 Modeling of Molecules, Materials and Processes (GD) | | | 3(3-0-6) |
| CHE 502 Chemical and Statistical Thermodynamics (GD) | | | 3(3-0-6) |
| CHE 503 Chemical Kinetics and Reaction Engineering (GD) | | | 3(3-0-6) |
| CHE 504 Transport Phenomena in Chemical and Biological Engineering (GD) | | | 3(3-0-6) |
| CHE 556 Safety and Environmental Risk Analysis (GD) | | | 3(3-0-6) |
| CHE 623 Advanced Catalysis and Electrocatalysis (GD) | | | 3(3-0-6) |
| CHE 696 Selected Topics: "Advanced Materials" (GD) | | | 3(3-0-6) |
| CHE 696 Selected Topics: "Advanced Zeolites in Catalysis" (GD) | | | 3(3-0-6) |
| CHE 696 Selected Topics: "Crystallization" (GD) | | | 3(3-0-6) |
| CHE 696 Selected Topics: "Solid State Chemistry I" (GD) | | | 3(3-0-6) |

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| CHE 696 | Selected Topics: "Solid State Chemistry II" (GD) | | | 3(3-0-6) |
| CHE 696 | Selected Topics: "Material Chemistry: Metal-Organic Frameworks - Characterization and Applications" (GD) | | | 3(3-0-6) |
| IST 502 | Data Structures (GD) | | | 3(3-0-6) |
| IST 503 | Algorithm Design and Analysis (GD) | | | 3(3-0-6) |
| IST 515 | Computational Machine Intelligence and Applications (GD) | | | 3(3-0-6) |
| IST 525 | Computer Architectures (GD) | | | 3(3-0-6) |
| IST 532 | Embodied Artificial Intelligence (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Applications of Computational Intelligence for Brain-Computer Interface" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Database Systems" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Introduction to IST Research" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Mathematical Foundation for Data Science" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Robot Operating System" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Computer Vision" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Natural Language Processing" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Probability" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Network Optimization" (GD) | | | 3(3-0-6) |
| IST 696 | Selected Topics: "Modeling and Simulation of Complex Systems" (GD) | | | 3(3-0-6) |
| MSE 501 | Thermodynamics and Kinetic Processes in Materials (GD) | | | 3(3-0-6) |
| MSE 502 | Chemical Synthesis of Materials (GD) | | | 3(3-0-6) |
| MSE 503 | Structure and Properties of Materials (GD) | | | 3(3-0-6) |
| MSE 504 | Characterization of Materials (GD) | | | 3(3-0-6) |
| MSE 521 | Advanced Synthesis for Organic and Inorganic and Biological Materials (GD) | | | 3(3-0-6) |
| MSE 541 | Materials for Energy Environmental and Biological Applications (GD) | | | 3(3-0-6) |
| MSE 545 | Catalytic Materials and Applications (GD) | | | 3(3-0-6) |
| MSE 624 | Molecular Design of Functional Polymers (GD) | | | 3(3-0-6) |
| MSE 627 | Qualitative Property Predictions for Transition Metal Complexes (GD) | | | 3(3-0-6) |
| MSE 667 | Selected Topics: "Advanced NMR Analysis" (GD) | | | 3(3-0-6) |
| MSE 667 | Selected Topics: "Coordination and Organometallic Chemistry" (GD) | | | 3(3-0-6) |
| MSE 667 | Selected Topics: "Molecular Orbital Theory of the Transition Metal Complexes" (GD) | | | 3(3-0-6) |
| MSE 667 | Selected Topics: "Solid State Chemistry" (GD) | | | 3(3-0-6) |
| MSE 667 | Selected Topics: "Functional Porous Materials and Periodic Structures" (GD) | | | 3(3-0-6) |
| 1.5.5) General Courses | | | | |
| BSE 562 | Business foundation (GD) | | | 3(3-0-6) |
| BSE 653 | Critical Thinking, Critical Writing, and Critical Skills for Researchers | | | 3(3-0-6) |
| 2) Thesis | | No less than | 48 | Credit |
| | BSE 691 Th BSE 691 Thesis (SU) | | | 0(0-0-0) |