Year 1 – Foundations of Scientific Thinking and Research Identity

Year 1 establishes the core scientific literacy essential for biomedical studies, while cultivating an early identity as a future healthcare professional. A central theme is building a conceptual understanding of biology and chemistry as the basis of human health. This theme weaves through General Biology I & II with Labs (BIOL 110/L and BIOL 120/L) and General Chemistry I & II with Labs (CHEM 110/L and CHEM 120/L), introducing principles of molecular structures, cellular function, and chemical reactivity.

Parallel to the science coursework, students develop crucial communication skills through Multimodal and Collaborative Writing (ENGL 110/120) and Interpersonal Communication in the Age of AI (COMM 110). Courses like Medical Terminology (COLL 110) introduce professional language early, supporting both clinical fluency and scientific discourse.

Quantitative literacy begins its scaffold with Calculus (MATH 130) and Applied Biostatistics (MATH 121), preparing students for data interpretation and the analytic demands of biomedical research and MCAT-style problem-solving.

A defining feature of Year 1 is the integration of research identity, primarily through the ISLaND Project, where students explore ecological relationships and molecular biology in local ecosystems with correlations to human healthcare and disease. Engagement in the East West Health Fair connects scientific study to community health, reinforcing healthcare's societal dimension.

Horizontally, Year 1 bridges sciences, communication, and community engagement. Vertically, it lays the essential groundwork for the more specialized biomedical sciences in Year 2 and beyond.

Year 2 – Systems Physiology, Molecular Foundations, and Physical Principles

Year 2 deepens the scaffold with the theme of systems-level understanding of human biology, driven by Systemic Physiology I & II (BIOL 221/L and BIOL 222). These courses link molecular knowledge to organ-level function, creating critical pathways for future clinical reasoning.

Simultaneously, Organic Chemistry I & II with Labs (CHEM 210/L and CHEM 220/L) continue building the molecular framework, focusing on reaction mechanisms, stereochemistry, and functional group transformations essential for understanding biochemical processes and drug interactions.

Physics I & II with Labs (PHYS 210/L and PHYS 220/L) contribute another layer to horizontal integration, demonstrating how physical principles underlie physiological processes such as hemodynamics, respiration, and neural signaling. This ensures students can analyze biological phenomena with quantitative rigor.

The Genetics and Genomics (BIOL 230) course introduces students to inheritance patterns, gene regulation, and molecular diagnostics, setting the stage for more advanced molecular and clinical coursework.

Horizontally, Year 2 reinforces the interconnectedness of chemistry, physics, and biological systems. Vertically, it propels students toward the molecular depth and clinical applications characteristic of Years 3 and 4.

Year 3 – Molecular Complexity, Translational Applications, and Research Development

Year 3 advances students into biomedical complexity and translational thinking, merging molecular insights with disease mechanisms and early therapeutic concepts.

A central theme is molecular underpinnings of disease, developed in the Fall through Microbiology with Lab (BIOL 310/L), Advanced Cell and Molecular Biology (BIOL 420), Biochemistry (CHEM 310), and Neuroscience (BIOL 410). These courses interconnect molecular structures, biochemical pathways, and cellular dysfunctions that manifest as clinical diseases. For example, biochemical pathways studied in Biochemistry become relevant in understanding microbial metabolism in Microbiology or neurotransmitter signaling in Neuroscience.

In the Spring semester, Medicinal Biochemistry emerges as a crucial bridge between molecular biology and clinical pharmacology. Here, students explore structure-activity relationships, drug design principles, and biochemical mechanisms of therapeutic agents. This course vertically builds on Organic Chemistry and Biochemistry, preparing students for the clinical decision-making processes addressed in Year 4's pharmacology and case-based medicine.

Research development remains a prominent theme, with students engaged in COLL 310 and COLL 320, where they transition from designing research questions to executing and analyzing independent scholarly projects. These experiences prepare them for the Honors Thesis in Year 4, while also cultivating skills essential for evidence-based medicine and scientific communication.

Horizontally, Year 3 blends content across biological scales, from molecular interactions to systemic diseases. Vertically, it bridges students' scientific expertise to the clinical reasoning they will refine in Year 4.

Year 4 – Clinical Integration, Professional Identity, and Capstone Scholarship

Year 4 represents the culmination of the BSMD scaffold, where students integrate prior learning into a cohesive understanding applicable to clinical practice and research.

A key theme is translating biomedical science into clinical reasoning and patient care, achieved through Biomedical Foundations of Medicine (BIOL 470). This course provides case-based learning that integrates microbiology, genetics, immunology, biochemistry, and physiology. Students analyze USMLE-style clinical vignettes, refining diagnostic logic and gaining familiarity with the complexities of real-world patient scenarios—an essential scaffold for medical and dental school success.

Pharmacology (BIOL 430) further develops this clinical connection, teaching students how drugs modulate physiological pathways and how molecular principles influence therapeutic decisions. This course directly connects back to Medicinal Biochemistry, forming a powerful vertical integration that links drug mechanism understanding to patient management.

Molecular Genetics (BIOL 450) enhances this clinical perspective, delving deeper into genetic disease mechanisms, molecular diagnostics, and emerging genomic technologies critical for personalized medicine. Students connect prior knowledge from Genetics, Cell Biology, and Biochemistry to real-world applications in clinical genomics.

Professional development is emphasized in COLL 420 – Emerging Healthcare Leaders, reinforcing ethics, leadership, and interpersonal skills essential for navigating modern healthcare environments.

The Honors Thesis sequence (COLL 499a and COLL 499b) serves as the capstone of the research scaffold, allowing students to execute a mentored project from proposal through presentation. This experience synthesizes skills in critical analysis, scholarly writing, and oral defense, mirroring expectations in professional programs and medical research.

Horizontally, Year 4 integrates disciplines into cohesive clinical reasoning and therapeutic planning. Vertically, it transforms students into emerging healthcare professionals who are scientifically grounded, clinically prepared, and research-engaged.