**Dental School Subjects and Topics**  
  
**Biomedical Foundations**

* **Biochemistry**
  + Protein structure/function
  + Enzyme kinetics & regulation
  + DNA replication, transcription, translation
  + Cell signaling pathways
  + Energy metabolism (glycolysis, TCA, oxidative phosphorylation)
* **Cell Biology**
  + Membrane structure & transport
  + Cell junctions, cytoskeleton
  + Organelle functions
  + Cell cycle & apoptosis
* **Genetics**
  + Mendelian & non-Mendelian inheritance
  + Chromosomal disorders
  + Gene regulation
  + Genetic testing/precision medicine
* **Developmental Biology & Embryology**
  + Fertilization & gastrulation
  + Neural crest migration
  + Craniofacial morphogenesis
  + Tooth development
* **Histology & Microscopic Anatomy**
  + Epithelial, connective, muscle, nervous tissue
  + Lymphoid & hematopoietic tissue
  + Organ systems under microscope
* **Gross Anatomy**
  + Head & neck dissection
  + Musculoskeletal system
  + Cardiovascular & thoracic structures
  + Abdomen & pelvis
* **Physiology**
  + Neurophysiology (action potentials, synapses)
  + Cardiovascular hemodynamics
  + Pulmonary ventilation/gas exchange
  + Renal filtration & fluid balance
  + GI motility & secretion
  + Endocrine hormone mechanisms

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### **Immunity, Microbiology & Disease**

* **Immunology**
  + Innate vs adaptive immunity
  + Antigen processing/presentation
  + Antibody structure & function
  + Cytokines, T-cell activation
  + Hypersensitivity types
* **Medical Microbiology**
  + Bacterial pathogenesis
  + Viruses: DNA vs RNA
  + Fungal & parasitic infections
  + Microbiome & dysbiosis
* **Pathology**
  + Inflammation & repair
  + Neoplasia & cancer hallmarks
  + Cell injury, necrosis, apoptosis
  + Immune-mediated disease (autoimmunity, allergy)

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### **Homeostasis & Pathophysiology**

* **Fluids/Electrolytes**
  + Sodium/potassium balance
  + Osmoregulation
  + Acid-base disorders
* **Hematology**
  + RBC & WBC development
  + Hemostasis & clotting cascade
  + Anemias, leukemias, coagulopathies
* **Cardiovascular**
  + Cardiac electrophysiology
  + Blood pressure regulation
  + Ischemic heart disease
  + Heart failure & valvular disease
* **Pulmonary**
  + Gas exchange mechanisms
  + Pulmonary function tests
  + Obstructive vs restrictive disease
* **GI/Metabolism**
  + Digestion & absorption
  + Hepatic function
  + Metabolic disorders
* **Endocrine**
  + Thyroid, adrenal, pituitary physiology
  + Diabetes mellitus
  + Reproductive endocrinology

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### **Practice of Medicine (Clinical Skills)**

* **Clinical Interviewing**
  + History of present illness
  + Past/family/social history
  + Review of systems
* **Communication Skills**
  + Active listening
  + Empathy & cultural humility
  + Delivering difficult news
* **Physical Exam**
  + Vital signs
  + HEENT exam
  + Cardiac, lung, abdominal exam
  + Neuro exam basics
* **Clinical Reasoning**
  + Problem representation
  + Differential diagnosis
  + Evidence-based reasoning

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### **Essentials of the Profession**

* **Population Health**
  + Epidemiology & biostatistics
  + Risk factors & prevention
  + Social determinants of health
* **Health Policy**
  + U.S. health systems overview
  + Access & disparities
  + Insurance & reimbursement
* **Ethics & Professionalism**
  + Informed consent
  + Confidentiality & HIPAA
  + Conflicts of interest
  + Professional conduct

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### **Dental Anatomy & Occlusion**

* **Tooth Morphology**
  + Identification of each tooth type
  + Crown and root morphology
  + Anatomical landmarks (cusps, grooves, ridges, fossa)
* **Occlusion**
  + Centric relation vs maximum intercuspation
  + Static & dynamic occlusion
  + Guidance: canine, group function
* **Temporomandibular Joint (TMJ)**
  + Anatomy & function
  + Muscles of mastication
  + Mandibular movement patterns

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### **Oral Biology**

* **Oral Histology**
  + Enamel, dentin, cementum
  + Pulp tissue
  + Periodontal ligament, alveolar bone
  + Oral mucosa subtypes (masticatory, lining, specialized)
* **Embryology & Development**
  + Tooth germ development (bud, cap, bell stages)
  + Amelogenesis & dentinogenesis
  + Craniofacial development & genetic regulation
* **Oral Physiology**
  + Saliva composition & functions
  + Taste perception
  + Pain pathways in oral tissues
* **Craniofacial Genetics**
  + Genetic syndromes affecting craniofacial growth
  + Orofacial clefts
  + Molecular signaling in tooth development

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### **Oral Microbiology & Pathology**

* **Microbiology**
  + Oral flora & biofilms
  + Cariogenic bacteria (S. mutans, Lactobacilli)
  + Periodontal pathogens
  + Host–microbe interactions
* **Caries Process**
  + Demineralization & remineralization
  + Risk assessment tools
  + Caries prevention models
* **Oral Pathology**
  + Benign & malignant lesions
  + Cysts of the jaws
  + Oral potentially malignant disorders (leukoplakia, erythroplakia)
  + Oral manifestations of systemic disease

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### **Oral & Maxillofacial Radiology**

* **Radiographic Principles**
  + X-ray physics, exposure, ALARA principles
  + Radiographic anatomy (maxilla/mandible)
* **Imaging Techniques**
  + Intraoral: bitewing, periapical, occlusal
  + Extraoral: panoramic, cephalometric
* **CBCT Fundamentals**
  + Field of view selection
  + 3D anatomy interpretation
* **Radiation Safety**
  + Dose minimization strategies
  + Protective equipment

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### **Preclinical Simulation & Skills**

* **Operative Dentistry**
  + Instrumentation
  + Class I–V preparations (amalgam, composite)
  + Adhesive protocols
  + Finishing & polishing
* **Cariology & Prevention**
  + Sealant application
  + Topical fluoride therapy
  + Non-invasive caries management
* **Fixed Prosthodontics**
  + Crown preparations (PFM, all-ceramic, full cast)
  + Provisional restorations
  + Impression techniques & digital scanning
  + CAD/CAM workflows
* **Removable Prosthodontics**
  + Complete denture design
  + RPD components & framework design
  + Jaw relation records
  + Try-in & insertion protocols
* **Periodontology (Preclinical)**
  + Periodontal instrumentation
  + Scaling & root planing on typodonts
  + Periodontal charting
  + Intro to surgical concepts
* **Endodontics (Preclinical)**
  + Access cavity design
  + Working length determination
  + Canal instrumentation & obturation
  + Endo microbiology & irrigation
* **Orthodontics (Intro)**
  + Growth & development of craniofacial complex
  + Cephalometric tracing basics
  + Malocclusion classification
  + Space analysis
* **Pediatric Dentistry (Foundations)**
  + Primary tooth morphology
  + Behavior guidance techniques
  + Pulp therapy in primary teeth
  + Stainless steel crowns
* **Oral Surgery & Local Anesthesia**
  + Pharmacology of anesthetics
  + Injection techniques (infiltration, block)
  + Principles of exodontia
  + Medical emergencies in dental settings
* **Infection Control**
  + Sterilization & disinfection
  + PPE protocols
  + OSHA standards
  + Needle/sharps safety

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### **Evidence-Based Dentistry**

* **Critical Appraisal**
  + Study design (RCTs, cohort, case-control)
  + Levels of evidence
  + Bias & confounding
* **Biostatistics for Dentistry**
  + Descriptive statistics
  + p-values & confidence intervals
  + Sensitivity/specificity
  + Systematic reviews & meta-analyses
* **Clinical Application**
  + PICO question framing
  + Integrating literature into treatment planning

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### **Treatment Planning & Patient Management**

* **Risk-Based Planning**
  + Caries risk
  + Periodontal risk
  + Medical comorbidities
* **Comprehensive Planning**
  + Sequencing of care
  + Interdisciplinary considerations
* **Patient Communication**
  + Informed consent
  + Shared decision-making
  + Motivational interviewing

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### **Comprehensive Care (Longitudinal Clinic)**

* **Diagnosis**
  + Patient history & risk assessment
  + Clinical exam (extraoral, intraoral, occlusal, periodontal)
  + Radiographic interpretation
* **Treatment Planning**
  + Sequencing of multidisciplinary care
  + Risk/benefit analysis
  + Patient-centered planning
* **Preventive Care**
  + Oral hygiene instruction
  + Nutritional counseling
  + Preventive agents (sealants, fluoride, antimicrobials)
* **Maintenance**
  + Recall intervals
  + Periodic reassessment
  + Long-term monitoring

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### **Restorative Dentistry**

* **Direct Restorations**
  + Composite techniques (anterior/posterior)
  + Amalgam restorations
  + Esthetic considerations
* **Indirect Restorations**
  + Inlays/onlays
  + Crown and bridge
  + Shade selection & esthetics
* **Occlusal Rehabilitation**
  + Management of wear & attrition
  + Equilibration
  + Restoring vertical dimension

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### **Periodontology**

* **Non-Surgical Therapy**
  + Scaling & root planing
  + Local antimicrobials
  + Maintenance programs
* **Surgical Therapy (Introduction)**
  + Flap design & suturing
  + Osseous recontouring
  + Guided tissue regeneration
  + Periodontal plastic surgery basics
* **Risk Management**
  + Smoking & systemic disease
  + Risk-based recall intervals

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### **Endodontics**

* **Diagnosis**
  + Pulp vitality testing
  + Periapical diagnosis
* **Root Canal Therapy**
  + Single-rooted vs multi-rooted techniques
  + Working length determination
  + Obturation methods
* **Management of Complications**
  + Instrument separation
  + Ledge formation
  + Retreatment strategies

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### **Prosthodontics**

* **Fixed Prosthodontics**
  + Multi-unit bridge preparation
  + Post & core restorations
  + Provisionalization
* **Removable Prosthodontics**
  + RPD delivery & adjustments
  + Complete denture fabrication
  + Immediate dentures
* **Implant Prosthodontics**
  + Prosthetically driven planning
  + Abutment selection
  + Impression & delivery of implant crowns

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### **Oral & Maxillofacial Surgery**

* **Surgical Exodontia**
  + Flap reflection
  + Bone removal
  + Sectioning of teeth
* **Minor Oral Surgery**
  + Biopsy techniques
  + Management of cysts & benign lesions
* **Medical Emergencies**
  + Airway management
  + Syncope, allergic reactions
  + Emergency pharmacology
* **Sedation (Observation)**
  + Nitrous oxide monitoring
  + IV sedation protocols (exposure, not full training)

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### **Oral Medicine & TMD**

* **Orofacial Pain**
  + Differential diagnosis (dental vs non-dental)
  + Neuropathic pain
  + TMD management (splints, PT, pharmacotherapy)
* **Oral Lesions**
  + Aphthous ulcers
  + Candidiasis
  + Lichen planus
* **Systemic Disease & Oral Health**
  + Diabetes & periodontitis
  + Immunosuppression & oral manifestations
  + Cancer therapy complications (mucositis, xerostomia)

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### **Orthodontics**

* **Diagnosis**
  + Cephalometric interpretation
  + Cast analysis
* **Treatment Planning**
  + Interceptive orthodontics
  + Limited orthodontic treatment
* **Adjunctive Orthodontics**
  + Pre-prosthetic orthodontics
  + Alignment for restorative cases

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### **Pediatric Dentistry**

* **Behavior Guidance**
  + Tell-show-do
  + Nitrous oxide sedation
  + Protective stabilization (last resort)
* **Restorative in Primary Teeth**
  + Glass ionomer, composite, amalgam
  + Stainless steel crowns
* **Pulp Therapy**
  + Pulpotomy, pulpectomy
* **Trauma Management**
  + Luxation injuries
  + Avulsions & reimplantation protocols
* **Special Needs Care**
  + Children with developmental disabilities
  + Medically complex pediatric patients

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### **Geriatric & Special Care Dentistry**

* **Medical Considerations**
  + Polypharmacy
  + Xerostomia & hyposalivation
  + Cognitive impairment (Alzheimer’s, dementia)
* **Prosthetic Challenges**
  + Atrophic ridges
  + Retention issues
* **Access & Accommodation**
  + Wheelchair-bound patients
  + Home care strategies

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### **Oral & Maxillofacial Radiology**

* **Advanced Imaging**
  + CBCT interpretation
  + 3D visualization of pathology
* **Case-Based Diagnostics**
  + Impactions
  + Jaw pathology
  + Sinus involvement

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### **Emergency & Urgent Care**

* **Triage**
  + Acute pain & swelling
  + Dental trauma
* **Immediate Management**
  + Incision & drainage
  + Temporary restorations
  + Antibiotic stewardship

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### **Community-Based Dentistry**

* **Public Health Rotations**
  + Federally qualified health centers (FQHCs)
  + School-based sealant programs
* **Health Equity**
  + Barriers to care
  + Cultural competence

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### **Practice Management & Ethics**

* **Business Basics**
  + Insurance & reimbursement
  + Billing & coding
* **Risk Management**
  + Documentation & informed consent
  + HIPAA & compliance
* **Professionalism**
  + Ethical decision-making
  + Conflict resolution
* **Quality Improvement**
  + Outcome tracking
  + Patient satisfaction

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### **Advanced Comprehensive Care (Primary Focus)**

* **Interdisciplinary Case Management**
  + Full-mouth rehabilitation
  + Coordination across prosthodontics, perio, ortho, oral surgery
  + Complex treatment planning with systemic conditions
* **Esthetic Dentistry**
  + Smile design principles
  + Veneers (ceramic/composite)
  + Whitening protocols
  + Esthetic integration with implants and prosthodontics
* **Complex Restorative**
  + Management of failed restorations
  + Bonding to compromised substrates
  + Post and core systems

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### **Implant Dentistry (Restorative Focus)**

* **Digital Planning**
  + CBCT-guided implant planning
  + Surgical guide design
* **Prosthetic Components**Abutment types (stock vs custom)
  + Screw-retained vs cement-retained
* **Restorative Protocols**
  + Implant-level vs abutment-level impressions
  + Single-tooth implant restorations
  + Multi-unit implant prostheses
* **Maintenance**
  + Peri-implantitis prevention
  + Long-term follow-up

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### **Specialty Selectives/Electives**

* **Endodontics (Advanced)**
  + Retreatment protocols
  + Microscope-assisted endo
  + Surgical endodontics (apicoectomy principles)
* **Periodontology (Advanced)**
  + Implant site development
  + Mucogingival surgery
  + Guided tissue/bone regeneration
* **Prosthodontics (Advanced)**
  + Esthetic zone fixed cases  
    Full-arch prostheses
  + Maxillofacial prosthetics exposure
* **Oral Medicine**
  + Management of medically complex patients
  + Long-term oral disease surveillance
* **Orthodontics**
  + Clear aligner therapy basics
  + Pre-prosthetic orthodontic planning
* **Pediatric Dentistry**
  + Advanced trauma cases
  + Complex special needs care
  + Hospital dentistry observation

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### **Case Conferences & Interdisciplinary Seminars**

* **Treatment Planning Rounds**
  + Case presentations across specialties
  + Faculty critique and peer learning
* **Interdisciplinary Collaboration**
  + Integration with MDs and other healthcare professionals
  + Managing dental–medical comorbidities
* **Ethics & Professionalism**
  + Ethical dilemmas in advanced cases
  + Equity in access to specialty care

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### **Community-Based Externships**

* **Service Learning**
  + Rotations in community health centers
  + Underserved population focus
* **Public Health Dentistry**
  + Oral health promotion
  + School-based programs
  + Integration with local/state health systems
* **Global/International Electives (optional)**
  + Short-term service projects
  + Comparative public health systems

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### **Oral & Maxillofacial Radiology (Advanced)**

* **Complex Diagnostics**
  + TMJ imaging
  + Pathologic lesion interpretation
  + Airway analysis with CBCT
* **Treatment Planning Integration**
  + Radiology in implant planning
  + Multispecialty collaboration

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### **Practice Readiness & Transition**

* **Business of Dentistry**
  + Private practice vs academic vs public health models
  + Financial management
  + Insurance systems
* **Risk & Compliance**
  + Jurisprudence and licensure law
  + Record-keeping best practices
* **Leadership & Management**
  + Team leadership
  + Delegation and dental auxiliary supervision
* **Quality & Safety**
  + Continuous quality improvement
  + Infection control audits

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### **Scholarly Project / Research Requirement**

* **Capstone Research**
  + Literature review and project design
  + Data collection & analysis
  + Manuscript or poster preparation
* **Dissemination**
  + Presentation at HSDM Research Day
  + External conference participation
* **Mentorship**
  + Faculty-led supervision
  + Interdisciplinary research opportunities