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| **SMK 12-Credit Option: Educator Reference Guide** |
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| **4/13/2023** |
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# Biology

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| --- | --- | --- |
| * Anatomy * Animal biochemistry * Animal behavior * Anthropology * Aquatic biology * Aquatic Ecology * Arboriculture * Astrobiology * Bacteriology * Biochemistry * Bioenergetics * Bioinformatics * Biological Statistics * Biology * Biogeography * Bioinorganic chemistry * Biophysics * Biotechnology * Botany * Cell biology * Chromatography * Climatology * Clinical biochemistry * Cryobiology * Cytology * Dendrology * Developmental biology | * Ecology * Ecosystems * Endocrinology * Entomology * Environmental Science * Enzymology * Ethology * Evolution biology * Fish Biology * Fluid dynamics in biological systems * Genetics * Hydrobiology * Immunology * Ichthyology * Invertebrate Biology * Mammalogy * Marine biology * Metabolomics * Microbiology * Molecular biology * Mycology * Neuroscience * Oceanography / Oceanology * Ornithology * Paleobiology * Paleontology | * Parasitology * Phycology * Planktology * Pomology * Primatology * Photobiology * Phytogeography * Plant Biology * Plant biochemistry * Plant Pathology * Phenology * Physiology * Radiobiology * Safety practices * Science and engineering practices * Soil Sciences * Synecology * Theoretical biology * Toxicology * Vertebrate Biology * Virology * Zoogeography * Zoology |
| Science and Engineering Practices   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in an argument from evidence * Obtaining, evaluating, and communicating information | | |

# Business

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| * Business communications * Business management * Human resource management * State and federal business law * Business marketing | * Accounting principles and procedures * Business technology and information systems * Macro-and microeconomics * Business mathematics * Principles and procedures related to entrepreneurship |

# Chemistry

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| --- | --- |
| * Agricultural biochemistry * Agricultural chemistry * Agrochemistry * Analytical chemistry * Animal biochemistry * Astrochemistry * Atmospheric chemistry * Bioanalytical chemistry * Biochemistry * Bioinorganic chemistry * Cell biology * Chemical engineering * Chemical kinetics * Chemistry * Chemurgy * Chemometrics * Chromatography * Clinical biochemistry * Cluster chemistry * Coordination chemistry * Electrochemistry * Endocrinology * Energetics * Engineering thermodynamics * Environmental chemistry * Enzymology * Forensic chemistry genetics * Geochemistry * Green chemistry * Heat transfer * Immunology * Inorganic chemistry | * Marine chemistry * Materials science and processing * Mass spectrometry * Medicinal chemistry * Metabolomics * Molecular biology * Nanochemistry * Nuclear chemistry * Ocean chemistry * Organic chemistry * Organometallic chemistry * Particle Physics * Pharmacology * Photochemistry * Physical chemistry * Physical Organic Chemistry * Plant biochemistry * Polymer chemistry * Molecular biology * Molecular Physics * Quantum chemistry * Safety practices * Science and engineering practices * Soil Sciences * Solid-state chemistry * Spectroscopy * Stereochemistry * Strength of materials * Surface chemistry * Thermochemistry * Toxicology * Wet chemistry |
| Science and Engineering Practices   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in an argument from evidence * Obtaining, evaluating, and communicating information | |

# Dance

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| * Styles & Technique; including, but not limited to: * Aerial, African, Ballet, Ballroom, Contemporary, Classical Chinese, Folk, Hip-hop, Jazz, Kathak, Latin, Modern, Social, Street, Swing, Tap. * Choreography; including, but not limited to: * Explorations of the use of different elements of dance, such as design, energy (quality of movement), time (rhythm, speed, syncopation of movements), space (low, medium, high), dynamics and form * Approaches to choreography such as Improvisation, Composition. * Notation or methods of recording ideas, (e.g. Laban, Benesh) * Science & Education; including, but not limited to: * Strength or agility training * Human anatomy, kinesiology, or somatics such as Alexander Technique, Body Mind Centering, Pilates, GYROTONICS/GYROKINESIS® * Production; including, but not limited to: * Theatrical design, such as lighting, stage, sound, costume, or props * Theatrical promotion or management, Entrepreneurship, community outreach and/or communication * Emergent technologies, such as simulated or virtual dance. * History & Literature; including, but not limited to: * Survey across time and/or culture focused on how the goals and purpose of the arts have changed over time and space. * Cultural studies, ethnic studies or other cultural perspectives with the arts. * Individual artistic movements (e.g., Avant-garde, Romanticism, minimalism) and how they interact with society and culture. | * In depth studies of individual artists, individual artworks, organizations, artistic forms or style * Criticism; including, but not limited to: * Approaches to analysis and critique of artwork * Experience with leading and participating in critique of one’s own work. * Criteria for judging a collection of artwork * Philosophy of art (e.g. purpose of art, aesthetics, role of art in our lives and society) * Research methods * Education; including, but not limited to: * Approaches to students with special needs, such as therapeutic approaches, * Psychology and child development, such creativity, or cognitive Learning/development through art * Models/Methods/Strategies pertaining to goals of Arts Education; including, but not limited to:   + Generate and conceptualize artistic ideas and work   + Organize and develop artistic ideas and work   + Refine and complete artistic work   + Select, analyze and interpret artistic work for presentation   + Develop and refine artistic techniques and work for presentation   + Convey meaning through the presentation of artistic work   + Perceive and analyze artistic work   + Interpret intent and meaning in artistic work   + Apply criteria to evaluate artistic work   + Synthesize and relate knowledge and personal experiences to make art |

# Deaf and Hard-of-Hearing (ASL)

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| * Knowledge of the perception, acquisition and processing of language (including both spoken and sign language) * Knowledge of strategies for supporting language acquisition in sign language * Knowledge of theories in typical and atypical child development as it relates to children who are deaf or hard of hearing, including emotional, social and intellectual development * Knowledge of the design and modifications of curricular and instructional materials to ensure accessibility of the curriculum for deaf or hard of hearing students with and without special needs * Knowledge of strategies for promoting literacy among students who are deaf or hard of hearing * Knowledge of the clinical foundations of hearing * Knowledge of the relationship between ASL and English and strategies for translating between ASL and English | * Knowledge of Deaf culture, Deaf history and the Deaf community * Knowledge of medical, social, and ethical issues related to educating students who are deaf or hard of hearing * Knowledge of Federal and State Special Education Laws, Individualized Education Programs (IEPs) and Section 504 of the Rehabilitation Act of 1973 (29 USC 794) plan development and implementation for students who are deaf or hard of hearing * Critical analysis and application of research relevant to educating students who are deaf or hard of hearing. * *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History and Social Science* |

# Deaf and Hard-of-Hearing (Oral/Aural)

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| * Hearing and Hearing Technology including   + The anatomy and physiology of ear and neural pathways, physics of sound and psychoacoustics including auditory perception, speech acoustics and impact of environmental acoustics on speech understanding and listening   + Hearing measurement and etiology (both objective and subjective screening and test methods), test interpretation, hearing levels and the impact on listening and speech perception   + Function and uses of available sensory devices and hearing assistive technology | * + Auditory Functioning including   + Typical auditory development, auditory development of children with hearing loss, auditory development using hearing technology, the auditory hierarchy, acoustic phonetics (sounds of speech and transmission/reception), appropriate electroacoustic and functional assessments, and factors that impact auditory development   + Spoken Language Communication including     - Speech production: sequence of development (typical and atypical), anatomy and physiology of the speech/voice mechanism; and formal and informal speech production assessment measures   + See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History and Social Science |

# Digital Literacy/Computer Science

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| * Computing and Society * Understand safety and security concepts, security, and recovery strategies, and how to deal with cyberbullying and peer pressure in a social computing setting. * Understand, analyze impact and intent of, and apply technology laws, license agreements and permissions. * Recognize, analyze, and evaluate the impact of technology, assistive technology, technology proficiencies, and cybercrime in people's lives, commerce, and society. * Digital Tools & Collaboration and Computing Systems * Selection and use of digital tools or resources and computing devices to create an artifact, solve a problem, communicate, publish online, or accomplish a real-world task. * Use of advance research skills including advanced searches, digital source evaluation, synthesis of information and appropriate digital citation. (Standards: 6-8.DTC.c and 9-12.DTC.c) * Understand how computing device components work. Use of troubleshooting strategies to solve routine hardware and software problems. | * Understand how networks communicate, their vulnerabilities and issues that may impact their functionality. Evaluate the benefits of using a service with respect to function and quality. * Computational Thinking * Creation of new representations, through generalization and decomposition. Write and debug algorithms in a structured language. * Understand how different data representation affects storage and quality. Create, modify, and manipulate data structures, data sets, and data visualizations. * Decompose tasks/problems into sub-problems to plan solutions. * Creation of programs using an iterative design process to create an artifact or solve a problem. * Creation of models and simulations to formulate, test, analyze, and refine a hypothesis. |

# Early Childhood (PreK-2)

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| *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History, and Social Science courses.* |

# Earth and Space Science

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| * Aerodynamics * Aerology * Aeronomy * Agronomy/Agrology * Algology * Aquatic Ecology * Asteroseismology * Astrobiology * Astrochemistry * Astrogeology * Astrometry * Astronomy * Astrophysics * Atmospheric chemistry * Barometry * Bathymetry * Bedrock Geology * Biometeorology * Cartography * Cetology * Chronology * Climatology * Cosmology * Crystallography * Earth Science * Exoplanetology * Edaphology * Environmental Science * Exobiology | * Fluid Dynamics * Gemology * Geochronology * Geology * Geomagnetism * Geomorphology * Geophysics * Glaciology * Heliophysics * Helioseismology * Hydrobiology * Hydrogeology * Hydrology * Hydrometeorology * Hypsometry * Limnology * Lithology * Magnetostratigraphic * Marine Biology * Marine chemistry * Marine Physics * Meteorology * Micropaleontology * Mineralogy * Natural Resources * Neotectonics * Ocean chemistry * Oceanography/Oceanology * Orography | * Paleoceanography * Paleo magnetism * Paleontology * Paleo Seismology * Paleo-Tempestology * Pedology * Petrology * Photometry * Phycology * Planetology * Planktology * Pomology * Radiometry * Safety practices * Science and engineering practices * Sedimentology * Seismology * Seismotectonics * Selenography * Soil Sciences * Space Science * Spectroscopy * Stratigraphy * Surficial Geology * Tectonophysics * Tectonics * Topo Climatology * Topography * Volcanology |
| Science and Engineering Practices   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in an argument from evidence * Obtaining, evaluating, and communicating information | | |

# Elementary

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| * *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History, and* Social *Science courses.* |

English

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| * Composition process * Cognitive linguistics * Developmental literacy * Digital literacy * Drama * English * Fiction * Genres of literature * Grammar * History and structure of the English language * History and studies of language * Journalism * Linguistics * Listening practices * Literacy technology * Literary criticism * Literature (e.g., American, British, children’s, etc.) * Media literature * Morphology * Myths and folktales * Non-fiction * Oral composition * Phonetics * Playwriting | * Poetry * Principles and theories of rhetoric * Prose * Psycholinguistics * Reading theory and research * Reading practices and processes * Reading comprehension * Reading in the content area * Remedial reading * Research in reading, writing, listening, and speaking * Rules and conventions of written and spoken English * Screenwriting * Semantics and pragmatics * Similarities and differences between oral and written communication * Sociolinguistics * Speaking * Syntax * Types of listening * Vocabulary * Writing |

# English as a Second Language

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| * Language and Linguistics * Language as a system: functions and registers of language * The structure and nature of language: Phonology, morphology, syntax, semantics, pragmatics, discourse varieties, aspects of social and academic language, rhetorical registers, and writing conventions * Language variation and change * Language acquisition and literacy development   + Theory and research in first and second language acquisition   + Knowledge of the significant theories and practices for developing reading skills and reading comprehension in English as a first language at different educational levels.   + Relevance of linguistic differences between the first and the second language for reading instruction in English   + Differences in initial reading instruction in English (including phonemic awareness and phonics) for students who may or may not be literate in their first language: effects of first language literacy on second language learning and literacy   + Formal and informal measures for assessing development in reading skills and their use with second language learners   + Development of listening, speaking, reading, and writing vocabulary   + Approaches and practices for developing writing skills and the use of writing tools.   + Writing process and formal elements of writing   + Oral/Aural fluency in English at different proficiency levels   + Social and academic English and academic language for the content areas   + Development of meta-linguistic skills and vocabulary appropriate to cognitive, academic, and language proficiency levels * Instructional approaches and best practices for teaching ESL   + Foundations of ESL instruction | * + Theories and sheltered strategies for developing English language skills in listening, speaking, reading, and writing for English language learners in bilingual or multilingual classrooms from the primary grades on   + Research-based practices for English language development   + Program models and teaching strategies for developing and integrating language skills.   + Planning and implementing standards-based ESL and content instruction * Socio-cultural and socio-emotional considerations in teaching ESL   + Regional, socioeconomic, and developmental factors influencing language variation and bilingualism or multilingualism.   + The nature and role of culture and its intersection with teaching and learning.   + Cultural, racial, ethnic, and linguistic identity   + Intercultural communication in the classroom   + Special populations and situations: long term English language learners, English learners with disabilities, and students with limited or interrupted formal education   + The role of the community, families, and schools in English language learner education * Formal and informal English language assessment procedures and instruments for English language learners: selection, administration, and interpretation; identification of bias and normal variation in performance as well as possible differentiation from learning disabilities. * Federal and State laws pertaining to the education of English language learners * Theoretical, political, and historical foundations of education for English language learners * Instruction, assessments, resources, research, and advances in the field of ESL * Strategies for school collaboration, family outreach, and community involvement for English language learners. |

# Foreign Language

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| * Spoken and written command of a standard version of the target language (the version used by a formally educated speaker of the language) * Knowledge of culturally and historically significant literary and non-literary texts and authors associated with the country of origin of the target language and of one other country with which the target language may now be associated * Knowledge of culturally and historically significant literary and non-literary texts and authors associated with the country of origin of the target language, literary traditions, periods, and genres * Introductory knowledge of the other arts (historical traditions, genres, and major artists) associated with the country of origin of the target language * Introductory knowledge of contemporary political, social, and artistic features of the country of origin of the target language and of one other country with which the target language may now be associated | * Introductory knowledge of significant literary and non-literary texts, the arts, and history of at least one other country or people with which the target language may now be associated * Introductory knowledge of the political, social and intellectual history of the country or culture with which the target language is or was originally associated * Children's literature, songs, and games in the target language * Characteristics of elementary reading and writing pedagogy in the target language * Similarities and differences between the target language and English * Theories of, and differences between, first and second language acquisition |

# Foreign Language: ASL

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| * Expressive and receptive fluency in American Sign Language at a level of proficiency set by the Board * Knowledge of deaf history * Knowledge of deaf culture * Introductory knowledge of deaf art * Knowledge of different literary genres; for example, children's literature, poetry, and games associated with the deaf | * Theories of first and second language acquisition for American Sign Language * Similarities and differences in the linguistic structure of American Sign Language and English * Knowledge of methods of instruction in American Sign Language * Knowledge of philosophies of American Sign Language |

# General Science

*See Biology, Earth and Space Science, Chemistry, and Physics*

# Health/Family and Consumer Sciences

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| * Human growth and development: physical (anatomy and physiology), emotional/mental, social, intellectual, and moral * Food science and nutrition * Physical fitness * Human sexuality * Disease prevention and control * First aid, safety, and injury prevention * Tobacco, alcohol, and other substance abuse prevention | * Current topics in health education, including family violence, child abuse, suicide, sexually transmitted diseases (including AIDS), teen pregnancy, violence prevention, and eating disorders * Parenting skills, early childhood education, and care * Family and interpersonal relationships * Public health functions and responsibilities * Management skills for family/consumer health and finance |

# History

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| * Ancient History * Anthropology * Archaeology * Behavioral science * Budgeting * Civics * Communication studies * Consumer rights * Criminology * Cultural linguistics * Culture * Demography * Economics * European History * Family and consumer sciences * Finance * Gender studies | * Geography * Global connectedness related to developments in arts, science, and technology * Government * History * International relations * Income * Insurance * Investing * Labor * Law * Legal management * Marketing * Market structures * Massachusetts History * Money | * News/media literacy * Personal financial literacy * Philosophy * Political science * Psychology * Public administration * Religion & systems of belief * Research in history/social science * Sociology * Social justice * Social science * Topography * Trade * US History * World History |

# History/Social Science

*See History above.*

# Instructional Technology Specialist

|  |  |
| --- | --- |
| * Understand safety and security concepts, security and recovery strategies, and how to support students to deal with cyberbullying and peer pressure * Understand, analyze impact of, and apply technology laws and license agreements and permissions * Recognize, analyze, and evaluate the impact of technology, including cybercrime and assistive technology, in people's lives, commerce, and society * Understand what it means to be a good digital citizen * Select and use appropriate digital tools and varied input techniques, such as keyboards and speech recognition software, to publish multimedia artifacts or to communicate, collaborate, or exchange information * Use online research skills to gather relevant information from multiple digital sources, evaluate the credibility and accuracy of sources, and appropriately attribute sources * Understand that computing devices can take different forms and have different components * Select and use a variety of computing devices and digital tools to troubleshoot and solve simple problems * Differentiate between tasks that are best done by computing systems and humans * Understand the components of a network and network authentication * Possess basic understanding of the relationship among computing systems, networks, and services * Understand binary and Boolean logic and how these are implemented in computer hardware and * software * Understand how graphics and text are represented in a computer system * Possess basic understanding of abstractions, computer programs (such as block-based programs), algorithms, and databases | * Understand how information can be collected, used, and presented with computing devices or digital tools * Understand how to create a model and use data from a simulation * Understand how to decompose tasks/problems into sub-problems to plan solutions * Understand how to write and analyze algorithms and block-based computer programs using an iterative design process * Collaborate with school and district leaders, content specialists and other stakeholders to identify the appropriate uses of technology resources to support the development, communication, and implementation of plans for improving student performance under M.G.L. c. 69, § 1I * Coach, mode, observe, and provide feedback for teachers in the integration of in-person learning and technology to improve, facilitate, and extend learning and instruction within and beyond the classroom; continuously monitor student progress to inform tailoring of instruction; individualize learning for each student; and allow students to advance to new content based upon mastery * Develop strategies for achieving equitable access to digital resources outside the classroom and connecting educators, students, and parents/guardians * Coach teachers and instruct students in the safe, healthy, legal, and ethical uses of digital information and technologies in people's lives, commerce, and society * Understand the impact of technology on instructional practice, student learning, and resource allocation at the school and district level * Select, support, and evaluate the use of assistive and adaptive technology and accessible educational materials for students and adults |

# Latin and Classical Humanities

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| * Selections commonly read in secondary schools from the works of Cicero, Caesar, Catullus, Vergil, Horace, Ovid, and Pliny the Younger in the original Latin * How English words are derived and formed from Greek and Latin prefixes, bases, and suffixes, and the influence of Greek and Latin on the technical vocabulary of the arts, sciences, and professions (medical and legal) * Works of Greek literature in translation including Herodotus, Homer, Plato, Sappho, Thucydides, and the four major dramatists * Culture and history of ancient Greece and Rome, with emphasis on those elements that contributed to the foundation of modern Western civilization, including: * Major myths and legends | * Significant characteristics of classical art, architecture, and technology * Major genres of literature * Political, social, and economic institutions * Linguistics and theories of classical language acquisition * Methods of research and criticism as they apply to the study of Latin and classical humanities * Basic reading knowledge of the Greek language as demonstrated by ability to translate from the first book of Homer's Iliad or from Plato's Apology * Knowledge of grammar and syntax of classical Latin |

# Library

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| * Characteristics, uses, and design of information systems, for standard reference sources and appropriate technologies * Selection, acquisition, organization, and maintenance of information resources * Appropriate equipment for using information resources * Development, organization, management, and evaluation of school library media programs and resource centers | * Literature for children and young adults * Selection, adaptation, and production of instructional materials * Federal and state laws and regulations pertaining to media, including those governing access to and reproduction of materials * Ethical issues affecting library media services * Community and governmental resources |

# Mathematics

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| * Aerodynamics * Abstract algebra * Algebra * Applied mathematics * Math Analysis * Analytics * Astrophysics * Atomic Physics * Automorphic forms * Calculus * Commutative Algebra * Combinatorics * Complex analysis * Computation * Cosmology * Data analysis * Differential equations * Discrete mathematics * Dynamical systems * Fluid dynamics * Game theory * Geometric analysis * Geometry * Group theory * History of mathematics | * Homological algebra * Knot theory * Lie theory * Linear algebra * Mathematical logic * Mathematical modeling * Mathematical physics * Nuclear Physics * Number theory * Numerical Analysis * Operations research * Operator theory * Patterns and functions * Probability * Quantitative reasoning * Real analysis * Regression * Riemann Surfaces * Set theory * Statistics * Theoretical physics * Topology * Trigonometry |

# Middle School: Humanities:

*See English, History, Reading, and Social Science*

# Middle School: Math/Science

*See Biology, Earth and Space Science, Chemistry, Physics and Math*

# Moderate Disabilities

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| * Educational terminology for students with mild to moderate disabilities * Preparation, implementation, and evaluation of Individualized Education Programs (IEPs) * Design or modification of curriculum, instructional materials, and general education classroom environments for students with moderate disabilities * Instruction on the appropriate use of augmentative and alternative communication and other assistive technologies | * Ways to prepare and maintain students with disabilities for general education classrooms; for example, use of behavioral management principles * Knowledge of services provided by other agencies * Federal and state laws and regulations pertaining to special education * *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History and Social Science* |

# Music

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| * Musical Interpretation; including, but not limited to: * Basics of standard notation, such as knowledge of note durations, clefs, meter, key, scales, flats, sharps, intervals, chords, and chord inversions. * Other styles of notations, such as Iconic, Solfege, tab, lead sheets, bar-based MIDI, or Nashville Number System. * Sight singing and sight reading. * Historical and cultural perspectives on interpretation. * Instrumental Proficiency & Technique; including, but not limited to: * Individual (e.g. studio, private lessons) or group performance (e.g. band, orchestra, ensemble) experience. * Methods (the technical skills to use different instruments) including string, brass, double reeds, vocal and keyboard skills. * Instrument maintenance and repair * Proficiency with historical, non-western, and non-traditional instruments, such as baroque, Gamelan, or experimental. * Vocal Proficiency & Technique; including, but not limited to: * Breath work, singing skills and vocal production Vocal health and conditioning * Technological Proficiency & Technique; including, but not limited to: * Exploring electric, electro-mechanical, and other forms of sound and music production. * Conducting Proficiency & Technique; including, but not limited to: * Group ensemble leadership and direction * Setting beat and tempo, dynamics, cueing, and providing unity. * Composition and Arranging; including, but not limited to: * Original musical composition for any instrument or instruments in any genre or style. * Computer compositions, such as algorithmic composition, and computer analysis of digital audio. * Exploration of story (lyrics) and song writing. * Sound editing, mixing and mastering * Musical arrangement including for multiple instrument and voices. | * Composition and Arranging; including, but not limited to: * Musical arrangement for specific purpose (e.g. soundtracks) * Music Theory & Analysis * Foundations of tonal music, such as types of intervals, scales, chords, and chord inversions. * Classical Western Analysis, such as how melody and chords interact with consonance, dissonance, and resolution (may also explore dominance and sub-dominance) * Considerations of other musical elements such as, melody, rhythm, counterpoint, harmony, tuning, durational proportions, acoustics, composition, orchestration, ornamentation, or improvisation. * Analysis approaches to other musical traditions and styles. * Exploration of musical forms and structure, such as sonatas. * Science and Education; including, but not limited to: * Physics of sound, such as acoustics * Psychology of perception or development * Approaches to musical education, such as Orff Schulwerk, Kodály, Dalcroze, Suzuki, Gordon * Musical Management and Production; including, but not limited to: * Concert Logistics, such setting up simple PA systems, amplifying musicians, and recording concerts * Musical promotion or management, such as entrepreneurship, community outreach and/or communication * History & Literature; including, but not limited to: * Survey across time and/or culture focused on how the goals and purpose of the arts have changed over time and space. * Cultural studies, ethnic studies or other cultural perspectives with the arts. * Individual artistic movements (e.g., Avant-garde, Romanticism, minimalism) and how they interact with society and culture. |

# Music cont.

|  |  |
| --- | --- |
| * History & Literature; including, but not limited to: * In depth studies of individual artists, individual artworks, organizations, artistic forms or styles * Criticism; including, but not limited to: * Approaches to analysis and critique of artwork * Experience with leading and participating in critique of one’s own work. * Criteria for judging a collection of artwork * Philosophy of art (e.g. purpose of art, aesthetics, role of art in our lives and society) * Research methods * Education; including, but not limited to: * Approaches to students with special needs, such as therapeutic approaches, * Psychology and child development, such creativity, or cognitive Learning/development through art | * Models/Methods/Strategies pertaining to goals of Arts Education; including, but not limited to:   + Generate and conceptualize artistic ideas and work   + Organize and develop artistic ideas and work   + Refine and complete artistic work   + Select, analyze and interpret artistic work for presentation   + Develop and refine artistic techniques and work for presentation   + Convey meaning through the presentation of artistic work   + Perceive and analyze artistic work   + Interpret intent and meaning in artistic work   + Apply criteria to evaluate artistic work   + Synthesize and relate knowledge and personal experiences to make art |

# Physical Education

|  |  |
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| * Principles of developmentally sound physical health and fitness * Lifespan growth, development, and nutrition * History and foundations of kinesiology * Range of appropriate play and sports for PreK-12 and the relevant motor skills | * Knowledge of appropriate physical and safety limitations, legal standards, tort liability, and first aid and Cardiac Pulmonary Resuscitation (CPR) * Knowledge of adaptations for students with disabilities |

# Physics

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| * Aerodynamics * Astrophysics * [Atomic Physics](https://en.wikipedia.org/wiki/Atomic_physics) * [Biophysics](https://en.wikipedia.org/wiki/Biophysics) * Chemical kinetics * [Chemical Physics](https://en.wikipedia.org/wiki/Chemical_physics) * Classical Mechanics * [Computational Physics](https://en.wikipedia.org/wiki/Computational_physics) * [Condensed Matter Physics](https://en.wikipedia.org/wiki/Condensed_matter_physics) * Cosmology * [Econophysics](https://en.wikipedia.org/wiki/Econophysics) * Electromagnetics * Electronics * Energy and power technologies * Energy and power systems * Engine fluid dynamics * [Engineering Physics](https://en.wikipedia.org/wiki/Engineering_physics) * Engineering thermodynamics * Fluid Dynamics * [Geophysics](https://en.wikipedia.org/wiki/Geophysics) * Heat transfer * Heliophysics * Hydraulic systems * [Mathematical Physics](https://en.wikipedia.org/wiki/Mathematical_physics) * Marine Physics | * Medical Physics * Molecular Physics * Nuclear Physics * Optical Physics * Optics * Particle Physics * Physical Chemistry * Pneumatic systems * Power technologies * Quantum chemistry * Quantum Computing * Quantum Mechanics * Radiometry * Relativity * Safety practices * Science and engineering practices * Spectroscopy * Statistical mechanics * Strength of materials * Structural systems * Thermochemistry * Thermodynamics |
| Science and Engineering Practices   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in an argument from evidence * Obtaining, evaluating, and communicating info | |

# Reading

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| * Knowledge of the significant theories, practices, and programs for developing reading skills and reading comprehension * Phonemic awareness and phonics: principles, knowledge, and instructional practices * History and nature of English vocabulary and of English-language dialects; development of vocabulary knowledge * Theories, research, and practices for reading instruction in the academic disciplines * Selection and use of appropriate programs, materials, and technology for reading instruction * Knowledge of, and selection criteria for, literature and informational books for children and adolescents * Screening and diagnostic instruments, their administration and use for determining student strengths and weaknesses | * Knowledge and use of a variety of informal and formal reading assessments * Second language acquisition and its relationship to literacy learning * Child and adolescent development and the timing of formal reading instruction * Cognitive development in adolescence and its relationship to reading instruction * Approaches and practices for writing instruction, including assessment of writing skills and their relationship to reading * Methods to support classroom teachers and tutors in the improvement of reading instruction, including consultation techniques and professional development |

# Severe Disabilities

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| * Definitions, etiologies, and characteristics of severely disabling conditions * Theories, concepts, and methods of assessing physical, emotional, intellectual, and social development in children and adolescents * Theories of language development and the effects of disabilities on learning * Reading   + Reading theory, research, and practice   + Knowledge of the significant theories, practices, and programs for developing reading skills and reading comprehension   + Phonemic awareness and phonics: principles, knowledge, and instructional practices   + Diagnosis and assessment of reading skills using standardized, criterion-referenced, and informal assessment instruments   + Development of a listening, speaking, and reading vocabulary   + Theories on the relationships between beginning writing and reading. vii. Theories of first and second language acquisition and development * Preparation, implementation, and evaluation of Individualized Education Programs (IEPs) | * How to design or modify curriculum, instructional materials, and classroom environments for students with severe disabilities * Ways to prepare and maintain students with severe disabilities for general education classrooms. For example, use of behavioral management principles * Knowledge of services provided by other agencies * Knowledge of appropriate vocational or alternative school programs, or work-study and community-based opportunities and alternative high school programs and how to refer students to them * Federal and state laws pertaining to special education * Techniques for developing skills designed to facilitate placement in least-restrictive environments * Instruction on the appropriate use of augmentative and alternative communication and other assistive technologies * Source and operation of orthotic devices, medical technologies, and computer-moderated prosthetic devices * *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History and Social Science* |

# Social Science

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| * Ancient History * Anthropology * Archaeology * Behavioral science * Budgeting * Civics * Communication studies * Consumer rights * Criminology * Cultural linguistics * Culture * Demography * Economics * European History * Family and consumer sciences * Finance * Gender studies | * Geography * Global connectedness related to developments in arts, science, and technology * Government * History * International relations * Income * Insurance * Investing * Labor * Law * Legal management * Marketing * Market structures * Massachusetts History * Money | * News/media literacy * Personal financial literacy * Philosophy * Political science * Psychology * Public administration * Religion & systems of belief * Research in history/social science * Sociology * Social justice * Social science * Topography * Trade * US History * World History |

# Speech

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| * Classical, modern, and contemporary theories of rhetoric * Role of oratory, public argument, and debate * Important orations in American history through the 20th century (including speeches made in other countries that have had an impact on American history) * How to compose and deliver a public speech * Rules of evidence that should govern persuasive messages | * Persuasive techniques used by professional persuaders. * Parliamentary procedure and other essential elements in conducting meetings * Structure of oral English, standard English usage, and appropriate speech in variety of situations * Requirements for critical listening and responding to messages * United States Supreme Court decisions on freedom of speech * Strategies for public speaking. |

# Technology/Engineering

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| * Automated drafting systems * Chemical engineering * Computers in industrial technology * Communication technologies * Computer-aided design and manufacturing * Computer-based analysis of structures * Computing architectures * Construction technologies * Data analysis * Data analytics * Data and visual analytics * Database design and management * Data driven decision making * Drafting techniques * Design systems * Electronics * Energy and power technologies * Energy and power systems * Energy systems design * Engine design * Engine fluid dynamics * Engineering * Engineering applications of statistics * Engineering controls * Engineering design and practices * Engineering manufacturing * Engineering mechanics * Engineering Physics * Engineering thermodynamics * Engine systems * Fluid dynamics * Graphics for designing media * Green Engineering * Financial Concepts * Heat transfer * Hydraulic systems * Industrial design | * Industrial engineering * Informational resources * Infrastructure systems * Machinery * Materials science and processing * Materials, tools, and manufacturing * Mathematical modeling * Mechanical design * Mechanical engineering * Mechanical systems * Microelectromechanical systems (MEMS) * Model development and use mold design * Pneumatic systems * Power technologies * Probability * Product development and production * Production management * Prototyping * Quantitative and qualitative decision-making * Risk management * Robotics * Safety practices * Science and engineering practices * Simulation * Social and cultural impacts of technology/engineering * Statistical mechanics * Statistics * Strength of materials * Structural systems * Technical presentations * Technical project management * Technological systems * Technologies transportation technologies * Traffic flow theory * Transportation systems * Wood structures |
| Science and Engineering Practices   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in an argument from evidence * Obtaining, evaluating, and communicating info | |

# Theater

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| * Acting & Technique; including, but not limited to: * Character development * Speech (e.g. clarity, vocal projection, dialect and accent) * Body movement (e.g. mime, Physical expressivity, stage combat, * Approaches (e.g. classical, Chekhov, method, Meisner, practical aesthetics) * Styles (e.g. humor, Improvisation, drama) * Directing & Technique; including, but not limited to: * Interpret the screenplay and translate it visually * Production schedule * Selection of material * Script analysis * Techniques/procedures for rehearsing * Staging theatrical works * Play/Screen writing; including, but not limited to: * Character development and dialogue * Plot & Story structure * Refinement and editing * Adaptation * Technical Theatre & Technique; including, but not limited to: * Props, Costume, make-up, or hair. (research, design, procurement, adjustment and alterations, and technique) * Scenery Design (research, design, and construction (including carpentry, electronics, choreography). * Sound (including design, amplification, audio effects, audio mixing and control) * Lighting (types of lighting equipment, approaches to modifying lighting (e.g. gels and other visual effects) * Cinematography & Technique; including, but not limited to: * Composition * Addressing technical challenges * Editing * Animation, stop-motion * Visual effects (Special effects, generated images, or computer-generated imagery (CGI)) | * Other forms of theatrical performance; including, but not limited to: * Improv, Puppetry, Stand-up, or Spoken word. * Science and Education; including, but not limited to: * Human anatomy, kinesiology, or somatics * Biological foundations of speech, such as speech pathology * Production; including, but not limited to: * Production manager, stage directing * Theatrical promotion or management, Entrepreneurship, budgeting, community outreach and/or communication * Specifics related to community, and children’s theatre * History & Literature; including, but not limited to: * Survey across time and/or culture focused on how the goals and purpose of the arts have changed over time and space. * Cultural studies, ethnic studies or other cultural perspectives with the arts. * Individual artistic movements (e.g., Avant-garde, Romanticism, minimalism) and how they interact with society and culture. * In depth studies of individual artists, individual artworks, organizations, artistic forms or styles * Criticism; including, but not limited to: * Approaches to analysis and critique of artwork * Experience with leading and participating in critique of one’s own work. * Criteria for judging a collection of artwork * Philosophy of art (e.g. purpose of art, aesthetics, role of art in our lives and society) * Research methods * Education; including, but not limited to: * Approaches to students with special needs, such as therapeutic approaches, * Psychology and child development, such creativity, or cognitive Learning/development through art |
| Theater cont. | |
| * **Education;** including, but not limited to: * Models/Methods/Strategies pertaining to goals of Arts Education; including, but not limited to:   + Generate and conceptualize artistic ideas and work   + Organize and develop artistic ideas and work   + Refine and complete artistic work * Select, analyze and interpret artistic work for presentation | * + Develop and refine artistic techniques and work for presentation   + Convey meaning through the presentation of artistic work   + Perceive and analyze artistic work   + Interpret intent and meaning in artistic work   + Apply criteria to evaluate artistic work   + Synthesize and relate knowledge and personal experiences to make art |

# Visual Arts

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| * Styles & Techniques of art; including, but not limited to: * Two-Dimensional Art: Collage, Drawing, Digital, Mixed Media, Painting, Printmaking, conventional and digital Photography, * Three-Dimensional Art: Architecture, Crafts, Jewelry, Mixed media, Sculpture. * Performance Art: (May overlap with Dance and Theater). * Design: Fashion, Interior, and Industrial. * Other areas of artistic experience and design such as video game environments or theme park experiences * Artistic Theory; including, but not limited to: * Elements of Art and the Principles of Design; including, but not limited to: balance, color, contrast, emphasis, form, line, movement, pattern, space, rhythm, shape, texture, unity/variety, and value * Presentation & Production; including, but not limited to: * Budgeting, curation, Entrepreneurship, community outreach, communication, and promotion. * Science and Education; including, but not limited to: * Psychology of visual perception and development * Theories of artistic education approaches (e.g. imitationalism, formalism, and emotionalism) * Scientific foundations of any specific art form. For example, chemistry for painting | * And necessary foundational technical skills, for example, carpentry for sculpture or computer science for digital photography. * History & Literature; including, but not limited to: * Survey across time and/or culture focused on how the goals and purpose of the arts have changed over time and space. * Cultural studies, ethnic studies or other cultural perspectives with the arts. * Individual artistic movements (e.g., Avant-garde, Romanticism, minimalism) and how they interact with society and culture. * In depth studies of individual artists, individual artworks, organizations, artistic forms or styles * Criticism; including, but not limited to: * Approaches to analysis and critique of artwork * Experience with leading and participating in critique of one’s own work. * Criteria for judging a collection of artwork * Philosophy of art (e.g. purpose of art, aesthetics, role of art in our lives and society) * Research methods * Education; including, but not limited to: * Approaches to students with special needs, such as therapeutic approaches, * Psychology and child development, such creativity, or cognitive Learning/development through art |

# Visual Arts cont.\*\*

|  |  |
| --- | --- |
| * **Education cont.;** including, but not limited to: * Models/Methods/Strategies pertaining to goals of Arts Education; including, but not limited to:   + Generate and conceptualize artistic ideas and work   + Organize and develop artistic ideas and work   + Refine and complete artistic work   + Select, analyze and interpret artistic work for presentation | * + Develop and refine artistic techniques and work for presentation   + Convey meaning through the presentation of artistic work   + Perceive and analyze artistic work   + Interpret intent and meaning in artistic work   + Apply criteria to evaluate artistic work   + Synthesize and relate knowledge and personal experiences to make art |

# Visually Impaired

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| * Similarities and differences between visually impaired and non-visually impaired children in emotional, social, physical, and intellectual development * Anatomy and physiology of the eye and visual abnormalities * Historical and current developments in education of the visually impaired in the United States and other countries * How to use state-of-the-art diagnostic information * Medical and educational research related to the visually impaired * Use of English Braille (UEB) for non-technical materials and UEB and Nemeth Braille Code for Mathematics for technical materials * Use of assistive technology, ex. low-vision devices * Design or modification of the curriculum and instructional materials for the visually impaired * Ways to prepare visually impaired students for classrooms ranging from general education classrooms to schools for the visually impaired * Features of family support and services * Preparation, implementation, and evaluation of Individualized Education Programs (IEPs) * Knowledge of Federal and State Special Education Laws, IEPs, and 504 plan development and implementation for students who are visually impaired | * Child development   + Basic theories of cognitive, social, emotional, language, and physical development from childhood through adolescence   + Characteristics and instructional implications of moderately and severely disabling conditions * Principles and research-based instructional practices for developing emergent reader skills (alphabetic principle, concepts of print, phonological and phonemic awareness) * Phonemic awareness and phonics; principles, knowledge, and instructional practices * Use of assessment for instruction and intervention. * Knowledge of a variety of formal and informal reading assessment tools * Use of data from screening, diagnostic, and formative assessments to identify individual strengths and weaknesses and differentiate instruction (prepare mini lessons, select appropriate materials, form flexible groups) * Knowledge of Response to Intervention models/components, including tiered instruction, shared responsibility and decision-making, research-based interventions, and progress monitoring   + Diagnosis and assessment of reading skills using standardized, criterion-referenced, and informal assessment instruments * *See English, Math, Sciences (Biology, Chemistry, Earth Science, Physics) History and Social Science* |

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# World Languages

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| * Spoken and written command of a standard version of the target language (the version used by a formally educated speaker of the language) * Knowledge of culturally and historically significant literary and non-literary texts and authors associated with the country of origin of the target language and of one other country with which the target language may now be associated * Knowledge of culturally and historically significant literary and non-literary texts and authors associated with the country of origin of the target language, literary traditions, periods, and genres * Introductory knowledge of the other arts (historical traditions, genres, and major artists) associated with the country of origin of the target language * Introductory knowledge of contemporary political, social, and artistic features of the country of origin of the target language and of one other country with which the target language may now be associated | * Introductory knowledge of significant literary and non-literary texts, the arts, and history of at least one other country or people with which the target language may now be associated * Introductory knowledge of the political, social, and intellectual history of the country or culture with which the target language is or was originally associated * Children's literature, songs, and games in the target language * Characteristics of elementary reading and writing pedagogy in the target language * Similarities and differences between the target language and English * Theories of, and differences between, first and second language acquisition |