

A Multiple Measures Approach to Demonstrating Content Knowledge Guidance Information (Revised November 2020)

Rationale

- ❖ Utilizing multiple measures in assessment is a strengths-based approach that will allow candidates to demonstrate the knowledge and skills required to be effective in the classroom.
- ❖ Utilizing multiple measures as an assessment policy supports efforts to diversify the teaching profession and helps provide all students with the teachers they need to learn and be successful.
- ❖ A multiple measures approach models for teacher candidates an approach to assessment that will be applicable in their practice.

Proposed model for demonstrating content knowledge required for licensure

All candidates recommended for licensure¹ will need to complete one of the following four options in demonstrating their content knowledge preparation for the classroom.

(1) Option one: subject matter test (per current policy)

- Requirement: Take and pass the TPSC-approved content test based on the established cut score.
- Documentation: Candidate submits passing score to TPSC; EPP notates successful completion on Program Completion Report (PCR).

(2) Option two: program completion (per current policy)

- Requirement: Candidate completes TSPC approved program at EPP (available only for those endorsements for which there is no TSPC-approved test or in addition to any required test).
- Documentation: EPP notates satisfactory completion of program on PCR.

(3) Option three: undergraduate or graduate degree in the endorsement area

- Requirement: Candidate completes an undergraduate or graduate degree from an accredited higher education institution² (or the equivalent, thereof, as determined by the Executive Director or Director of Licensure)³ in a major approved by TSPC⁴ as consistent with the content requirements of the endorsement area (as specified in TSPC rules⁵). The degree must include a minimum of 30 semester hours (45 quarter hours) in the major,⁶ with a 2.75 or higher GPA⁷ in that coursework. (See Appendix One below.)

¹ EPPs may determine the applicability of multiple measures options, including prior to matriculation (as part of the admissions process) or after candidate completion *only* for programs into which the candidate matriculated.

² One of the recognized [nationally accredited bodies](#).

³ Requests can be made via email to the TSPC Director of Program Approval (Wayne.Strickland@Oregon.gov).

⁴ Approved majors are those for which the title of the major matches the title of the endorsement or license name, as provided in OAR Division 220 and/or 420. If the title of the major does not match the endorsement or license name, contact the TSPC Director of Program Approval (Wayne.Strickland@Oregon.gov) for guidance.

⁵ See OAR Division 220 and/or 420.

⁶ This includes courses that would be acceptable in the major, offered by the college or university, for the requested endorsement area. *Examples:*

Math:

- Math prefix courses (non-remedial);
- Other courses, such as Physics, Engineering, etc., *only* if those courses would be counted by the institution for the math major. If the institution does not have a major in the area review the candidate's undergraduate institution for the appropriate major. If there is no such major at that institution, compare the course against one of Oregon's public institutions for their major to see if the course would be accepted.

Spanish:

- Spanish prefix courses.

⁷ To calculate the GPA, include only the courses within the major. Do not include remedial courses.

Methods or education foundations courses are allowed to be included in the GPA computation

- Documentation: Candidate submits official transcript(s) to TSPC;⁸ EPP verifies completion of appropriate degree/credit hour/GPA requirements and notates on PCR. For major equivalency, EPP submits recommendation to TSPC for approval.⁹
- Coursework may be completed at any time prior to EPP recommendation for licensure.

(4) Option four: subject matter test with supplemental data

- Requirement: Candidate scores 70 points or greater on the TSPC-approved content preparation matrix (**Appendix Two**). The matrix includes individual scores on the TSPC-approved content subject matter test, GPA in non-remedial level courses consistent with the endorsement area,¹⁰ and data from a TSPC-approved EPP assessment of content knowledge demonstrated in the clinical experience.¹¹ (See Appendix Two).
- Documentation: EPP verifies score on TSPC-approved test, GPA in content courses consistent with the endorsement,¹² and data from at least six applications of the EPP's clinical assessment instrument, approved by TSPC as a rigorous assessment of content knowledge (see the next two bullets). Results are notated on PCR.¹³
- The EPP university supervisor and the Cooperating Teacher must each complete at least two and an EPP faculty member at least one of the clinical assessment instruments, and each of the six assessments must be from a different observation period.
- The EPP clinical assessment instrument must be approved by the Executive Director¹⁴ prior to its utilization for demonstration of subject matter competency. The Executive Director will evaluate the assessment for content and construct validity as it relates to demonstration of subject matter knowledge within the endorsement area, and the EPP will be required to demonstrate the reliability of the assessment.¹⁵ The Executive Director may utilize an industry specific validity and reliability tool, such as the CAEP Evaluation Framework for EPP-Created Assessments, in making this determination. Proprietary instruments utilized by the EPP for this purpose will be similarly evaluated. The decision of the Executive Director whether to approve the instrument will be final.

(5) Option five: holistic assessment of experiential record

In order to satisfy content knowledge requirements utilizing the Holistic Assessment, the candidate must demonstrate competency within a majority of the standards within each

⁸ Review the [Licensing FAQs](#) page for complete information about official transcripts.

⁹ This occurs through a verification statement on the Program Completion Report. TSPC may audit EPP records or evidence used to demonstrate competency within this multiple measures framework at any time.

¹⁰ To determine which courses to include as within the major, refer to the specific endorsement area(s) listed in Appendix One, which provides a summary of the endorsement areas' specific course competencies. These summaries are consistent with course competencies included in rule. Single-subject content area course competencies are provided in Division 220 in the section that details how to add the competency to an existing Preliminary Teaching License. Program-required area course competencies are provided in Division 420. Examples: Integrated Science = [OAR 584-220-0110 \(3\)\(a\)\(B\)](#) and Art = [OAR 584-220-0310 \(3\)-\(4\)](#).

¹¹ Contact the TSPC Executive Director if questions remain after reviewing Appendix Two.

¹² The EPP must review official score reports for TSPC-approved tests and transcripts for the GPA. This information must be retained as part of the candidate's record.

¹³ This occurs through a verification statement on the Program Completion Report. TSPC may audit EPP records or evidence that are used to demonstrate competency within this multiple measures framework at any time.

¹⁴ All proposed assessments must be submitted to the TSPC Executive Director, regardless of their inclusion within the program review process. Requests for instrument approval or assistance may be sent to the TSPC Executive Director (Anthony.Rosilez@Oregon.gov).

¹⁵ To demonstrate reliability, EPPs must provide the TSPC Executive Director (Anthony.Rosilez@Oregon.gov) with a complete training plan that describes how all those who use the multiple measures clinical assessment tool will be trained and how they will calibrate inter-rater reliability. Note: Once conducted, these efforts would likely not be required more than every other year.

theme of each domain of the endorsement. (See [Content Knowledge Matrix](#) for an example of a matrix for Integrated Science.)¹⁶ Sufficiency of knowledge within each standard is determined as follows:

1. The candidate is not required to attempt the Commission adopted content exam in the endorsement area sought prior to utilizing this Holistic Assessment. However, an EPP may choose to require the exam for purposes of admissions, advising, or program completion.
2. The candidate may demonstrate knowledge in each standard through a combination of coursework, verified work experience relevant to the endorsement, P-20 teaching experience, alternative academic learning, and/or cultural practice.¹⁷
3. Any coursework, experiences, or cultural practice utilized in this assessment must be directly related to the standard, as determined and verified by members of the EPP established Content Knowledge Evaluation Team, which includes the following:
 - Coursework or alternative academic learning experiences: University faculty within the applicable endorsement area;
 - Work experience or cultural practice: EPP program lead (or designated committee/assessment team), in consultation with subject area experts¹⁸;
 - Teaching experience: Fully licensed school/district level administrator or teacher with at least three year's full-time experience in public education (in the endorsement area, if a teacher).
4. Sample forms of proof could include:
 - Transcripts;
 - Letter from supervisor or elder, as appropriate, for work, teaching, internship, related camp experience, or cultural knowledge;
 - Certificate of completion from community course/online course; or other type of PDUs;
 - Portfolio artifacts demonstrating knowledge;
 - Essay describing their experience;
 - Oral presentation of experience to the review/assessment team.
5. Documentation:
 - Candidate collects artifacts and/or documentation relevant to each of the standards within the endorsement area, as defined above.
 - The candidate, with support of the EPP, creates a portfolio of documentation and evidence demonstrating competency within the majority of endorsement area standards within each theme of each domain.¹⁹
 - The candidate completes the Content Knowledge Matrix by noting the portfolio

¹⁶ When an EPP wishes to utilize this option, they are to contact Director of Program Approval Dr. Wayne Strickland, who will, in consultation with the Director of Licensure, provide a matrix appropriate for the endorsement area.

¹⁷ Cultural practice is defined as lived experiences within the community which, by tradition, heritage, social norm, or community involvement, provide a candidate with applied knowledge related to the endorsement field at such a level that demonstrates a working understanding of the particular content standard(s) assessed.

¹⁸ Subject matter experts include individuals with direct work or community leadership experience within the applicable content or endorsement area, as applicable to the type of experiences the candidate is presenting to meet the standards. For example: If the candidate is using work experience to meet the standard, the candidate's supervisor from that work experience would be appropriate. Cultural practice example: A tribal elder who is recognized within the community with extensive historical, vocational, or cultural experience relevant to the content or endorsement area. The EPP program lead verifies the sufficiency of the experience of work supervisors or subject area experts.

¹⁹ See the Content Knowledge Matrix for the appropriate domains, themes, and standards to be addressed.

item(s) applied to each of the standards within the appropriate cell of the matrix.²⁰

- The candidate provides the documentation and artifacts to the appropriate Evaluation Team member.²¹
 - The Evaluation Team member verifies the experience or suggests other documentation or experiences needed in each of the standards within the endorsement area.
 - Upon satisfaction of the required content knowledge verified by each team member, each team member signs the Content Knowledge Matrix, attesting the candidate has satisfied the content knowledge requirements of the standards for which the team member has evaluated documentation and artifacts.
 - Once approved by *all* Evaluation Team members, the EPP documents satisfaction of content knowledge requirements on the Program Completion Report (TSPC) through the multiple measures process and provides the PCR to TSPC.
 - The EPP maintains a copy of the signed Content Knowledge Matrix and the portfolio of the documentation and evidence supporting the signed Content Knowledge Matrix. The Content Knowledge Matrix and portfolio may be viewed by TSPC at TSPC's request and may be included within unit/program audits.
6. The Holistic Assessment of Content Knowledge recognizes that unique experiences of educators may positively contribute to K-12 student learning. To determine the appropriateness of the adopted assessment, the Commission will collect data on educator effectiveness. Therefore, any candidate utilizing the Holistic Assessment of Content Knowledge for licensure purposes shall authorize TSPC and the EPP from which the candidates completed teacher preparation to request and receive data on their performance and effectiveness on K-12 student learning for a period of no more than three years from their teaching assignment(s) subsequent to licensure. The candidate will assist TSPC and the EPP in obtaining the requested documentation from their employer.²²

Reporting²³

EPPs will include in their annual reports an analysis of the means by which their completers fulfill the requirements for demonstrating content knowledge. This analysis will include the instrument(s) used in the clinical field experience to assess content knowledge preparation. Per TSPC rule, EPPs must have all documentation of subject matter competency available for TSPC audit at any time.

Waiver

These options do not preclude or replace the current waiver authority of the Executive Director provided by OAR 584-200-0100:

- (1) The Executive Director may waive, in part or in whole, the requirements for teaching, administrative and personnel service licenses if the applicant provides evidence of academic skills, experience and knowledge demonstrating mastery of the Commission-adopted standards for the license.

²⁰ Portfolio items (artifacts) are to be numbered and the numbers referenced in the appropriate cell of the Content Knowledge Matrix.

²¹ Portfolio items (artifacts) of coursework or alternative academic learning are to be reviewed by the university faculty member; work experience or cultural practice items are reviewed by the EPP program lead, in consultation with the subject area expert(s); teaching experience is reviewed by the appropriate licensed school educator.

²² This provision is suspended until such time as the SLDS (Statewide Longitudinal Data System) has been activated.

²³ Multiple measures assessments should be evaluated internally prior to a program completion report being submitted. If there was variation from the requirements in the framework or the appendix, the EPP shall seek prior approval.

The Executive Director reports waivers to the Commission which monitors the Executive Director's use of this waiver authority. *OAR 584-200-0100(1) (c)*

Appendix One: Undergraduate/graduate degree in endorsement area

Single-subject area endorsement

Endorsement areaⁱ	Undergraduate/graduate major or degree	Transcript must include course(s) content in the area(s) noted (= number of courses required)ⁱⁱ
Art	Any studio art degree (painting, drawing, sculpture, ceramics, etc.)	Studio art (3) ²⁴ Foundations of art (1) Historical/cultural context of art (1) Aesthetics/art criticism (1)
Biology	Biology Environmental Studies/Science Or any other degree in the biological sciences (e.g. Biochemistry, Bioengineering, Genetics, Molecular Biology, Marine Biology)	Ecology and environment (2) Genetics and evolution (2) Nature of science (1) Biochemistry and cell biology (1) Biological unity and diversity (1)
Chemistry	Chemistry Or any other degree in the chemical sciences (e.g. Chemical Engineering, Biochemistry)	Chemical reactions/energy/bonding (3) Matter and atomic structure (1) Stoichiometry and solutions (1) Nature of science (1)
English Language Arts	English (including area/period studies) Comparative Literature Creative writing Linguistics Journalism Humanities	Analysis/interpretation of literature (3) Composition/writing (2) Literacy/language conventions (1)
Health	Public/Community Health Kinesiology	Health promotion/risk reduction (2) Health advocacy/literacy (2) Health over the lifespan (1)
Integrated Science	Biology Chemistry Physics Integrated Physical Science, Life Science Earth Science (e.g. Marine Science ²⁵ , Geology, Meteorology, Astronomy)	Physical science (2) Life science (2) Earth/space science (2) Nature of science (1)

²⁴ The number in parentheses refers to courses, not credits.

²⁵ This may also be referred to as Oceanography.

Endorsement areaⁱ	Undergraduate/graduate major or degree	Transcript must include course(s) content in the area(s) noted (= number of courses required)ⁱⁱ
Mathematics	Mathematics Mathematics and Computer Science Statistics	Patterns, algebra, and functions (2) Mathematical processes/number sense (1) Measurement and geometry (1) Trigonometry and calculus (1) Statistics/probability/ discrete mathematics (1)
Music	Music (studio, composition, theory) Music Education	Music methodology and performance (3) Aural analysis skills (1) Music theory and composition (1) Music history and culture (1)
Physical Education	Kinesiology Physical Education	Growth and motor development (2) The physical education program (2) Movement activities (1) Lifelong physical fitness (1)
Physics	Physics Astronomy Engineering	Modern physics (3) Mechanics (1) Electricity and magnetism (1) Nature of science (1)
Social Studies	World History US History Political Science International Affairs/Policy Global Studies Area studies (Asia, Middle East, etc.) Ethnic studies Anthropology/Sociology Economics Geography Psychology	US History (2) World/non-US history (2) Geography/cultures (2) Government, economics, political science (1)
World Languages	Degree in specific language	n/a

Multiple-subjects endorsement

Elementary/Multiple Subjects	An undergraduate degree in any academic content area, with the following course content/credit hours reflected on the candidate's transcript: Humanities/language arts (4) Social sciences (2) Mathematics (4) Science (3) Art, health, fitness (2)
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ⁱ The Executive Director may later request Commission approval of course requirements for TSPC endorsements not included in this Appendix.

ⁱⁱ A course is generally defined as at least 3 semester or 4 quarter hours. In addition to the specific courses required herein, candidates must complete other courses in the endorsement area as needed to total 30 semester or 45 quarter hours. Courses which are used to meet the minimum course/credit hour requirement must be required as part of the major and must not be at the remedial level.

Appendix Two: Commission Approved Subject Matter Test Examination with Supplemental data

Using this method, candidates must receive a combined total of 70 out of 100 possible points, utilizing the following matrix.

Commission Approved Subject Matter Test (40 points maximum)ⁱⁱⁱ

Points are provided for the highest single total test score received by the candidate as follows:

- 40 points: 80-99% of passing score
- 30 points: 70-80% of passing score
- 20 points: 60-70% of passing score

Grade Point Average in Content Area Courses (30 points maximum)

Candidates will be awarded points for their GPA in undergraduate or graduate level courses taken within the content area/subject of the sought endorsement as follows:

- 30 points: content GPA 3.3-4.0
- 20 points: content GPA 2.75-3.2
- 10 points: content GPA 2.50-2.74

Candidates are required to have a minimum of 20 semester hours or 30 quarter hours of non-remedial level coursework to calculate these points. In evaluating the number of units attempted and the GPA of this coursework, the candidate's entire post-secondary academic record shall be considered.²⁶ This may include courses taken after matriculation in the teacher education program and after the candidate's attempt(s) on the Commission approved subject matter examination. Note: content pedagogy courses are not included in this calculation.

Content Knowledge Demonstrated through Clinical Experiences (30 points maximum)

Candidates will be scored on their demonstration of content knowledge based on the key assessment(s) used by the EPP for this purpose. At least six iterations of the assessment must be included.

- 30 points: candidate scores at highest level of proficiency in at least 75% of the rubric elements, and at least proficient in the remaining, for all items related to content preparation.
- 20 points: candidate scores at the acceptable or sufficient level of proficiency in at least 90% of the rubric elements related to content preparation.
- 10 points: candidate scores at the acceptable level in at least 75% of all items related to content preparation.

At least two assessments must be completed by a cooperating teacher, two by the EPP supervisor, and one by an EPP faculty member.

²⁶ The GPA calculation shall include all courses in the candidate's academic record (except remedial level courses) for each of the competencies within the endorsement. The calculation would not include just the highest grades received to meet the minimum number of courses, but must include the grades of all courses within the competency area.

ⁱⁱⁱ This is a provisional exam score calculation. The Executive Director will study the impact of this factor and report to Commission by July 1, 2020 with recommended adjustments.

Holistic Assessment of Content Knowledge

Content Knowledge Matrix – Integrated Science

ORELA DOMAINS Themes Standards			WAYS TO DEMONSTRATE CONTENT KNOWLEDGE					CONTENT EXAMPLES (Advisor should suggest examples of relevant artifacts.)
			Coursework	Alternative Academic Learning	Teaching Experience	Verified Work Experience	Cultural Practice	
1. NATURE OF SCIENCE								
A	Principles of Scientific Inquiry							
	1	Demonstrate knowledge of the principles and procedures for designing and carrying out scientific investigations.						
	2	Recognize methods and criteria for collecting, organizing, analyzing, and presenting scientific data.						
	3	Recognize the evidential basis of scientific claims						
	4	Demonstrate knowledge of safety procedures and hazards associated with scientific investigations.						
	5	Demonstrate knowledge of the materials, equipment, and technology used in the sciences.						
	6	Apply basic mathematical procedures in analyzing and representing data and solving problems in the sciences.						
B	History and Nature of Science							
	1	Demonstrate knowledge of the historical development of major scientific ideas, including contributions by men and women of diverse backgrounds.						
	2	Demonstrate knowledge of current major theories, models, and concepts in physical science, life science, and Earth and space science.						

	3	Identify unifying themes, principles, and relationships that connect the different branches of the sciences.						
	4	Demonstrate knowledge of the nature of science as a system of inquiry.						
C STEM Relationships								
	1	Analyze the interrelationships between science, technology, engineering, mathematics, and society.						
	2	Demonstrate scientific literacy in evaluating scientific research and the coverage of science in the media.						
	3	Analyze social, economic, and ethical issues associated with technological and scientific developments.						
PHYSICAL SCIENCE								
A Properties of Matter								
	1	Analyze various historical and contemporary models of atomic structure and the supporting evidence for these models.						Geology: stories of land and water formation, places where medicines grow, place as related to building, study of petroglyphs Oceanography: fish life cycle, estuary, fishing, harvest, tidal, navigation, hunting, migration and climate, water quality, climate change.
	2	Demonstrate knowledge of the quantum theory of matter and energy (e.g., atomic structure, chemical bonding).						
	3	Analyze the characteristics of elements, compounds, and mixtures, including colloids, suspensions, and solutions.						
	4	Analyze the colligative properties of solutions (e.g., freezing point, boiling point, osmotic pressure, vapor pressure).						
	5	Demonstrate knowledge of the organization of the periodic table and its usefulness in predicting the physical and chemical properties and relative reactivity of given elements.						

	6	Apply methods used to determine the chemical and physical properties of unknown substances.						
	7	Demonstrate knowledge of the basic principles of the kinetic molecular theory and the distinguishing characteristics of the four states of matter.						
	8	Demonstrate knowledge of the behavior of ideal gases, including the relationships between pressure, temperature, and volume.						
	9	Demonstrate knowledge of the characteristics of radioactive materials.						
B	Chemical Bonding, Reactions & Stoichiometry							
	1	Demonstrate knowledge of chemical formulas and the International Union of Pure and Applied Chemistry (IUPAC) rules of nomenclature.						
	2	Analyze different types of chemical bonds and intermolecular forces and their effect on the properties of matter.						
	3	Apply knowledge of stoichiometry and the mole concept in balancing chemical equations and solving problems involving the mass relationships of reactants and products.						
	4	Analyze chemical reactions, including acid-base reactions and oxidation-reduction reactions, in terms of the properties of reactants and products.						
	5	Demonstrate knowledge of factors that affect reaction rates, including the introduction of catalysts and changes in concentration or temperature.						
	6	Demonstrate knowledge of the concept of chemical equilibrium, the factors that influence chemical equilibrium, and Le Châtelier's principle.						

C	Energy Transformations in Physical & Chemical Systems							
	1	Analyze phase changes, phase diagrams, and heating and cooling curves.						
	2	Analyze factors that affect the solubility of a substance and the rate at which substances dissolve.						
	3	Demonstrate knowledge of the laws of thermodynamics and the principles of calorimetry, including solving basic calorimetry problems.						
	4	Analyze energy changes involved in phase transitions, dissolving solutes in solvents, and diluting solutions.						
D	Understanding Force, Motion & Energy							
	1	Demonstrate knowledge of Newton's three laws of motion in a variety of situations and the limitations of Newton's laws at high speeds.						
	2	Analyze motion in terms of concepts of displacement, velocity, and acceleration.						
	3	Analyze free body diagrams and vector properties to solve problems involving multiple forces in one and two dimensions.						
	4	Demonstrate knowledge of Newton's law of gravitation and its applications.						
	5	Analyze the types and uses of simple machines and their principles of operation.						
	6	Demonstrate knowledge of work, the conservation of energy, and different forms of energy (e.g., potential, kinetic, thermal).						
	7	Analyze the transfer of energy through convection, conduction, and radiation.						
E	Characteristics & Properties of Waves							
	1	Analyze the properties of waves (e.g., speed, frequency, wavelength).						

	2	Analyze the properties and propagation of sound waves.					
	3	Analyze the wave characteristics of the electromagnetic spectrum.					
	4	Analyze the effects of mirrors, lenses, and prisms on the behavior of light.					
	5	Demonstrate knowledge of refraction, reflection, and polarization of electromagnetic waves.					
	6	Demonstrate knowledge of the Doppler effect.					
	7	Demonstrate knowledge of the dual nature of light and matter.					
F	Electricity & Magnetism						
	1	Analyze characteristics of electric charge, electric force, static electricity, electric current, and potential difference.					
	2	Analyze the operation of series and parallel circuits and the relationship between electric current, voltage, and resistance described by Ohm's law.					
	3	Demonstrate knowledge of the characteristics of permanent magnets and magnetic fields.					
	4	Demonstrate knowledge of electromagnets and principles and applications of electromagnetism (e.g., transformers, inductors, motors, generators).					
LIFE SCIENCE							
A	Characteristics, Organization & Processes of Cells						Biology: life cycles, agriculture, hunting, anatomy, pollution/pesticide/poisoning Chemistry: Paint, pollution/pesticide/poisoning, tea and food preservation, tanning, soil improvement
	1	Demonstrate knowledge of cell theory and its implications.					
	2	Analyze the structure and function of organelles in eukaryotic and prokaryotic cells.					

	3	Demonstrate knowledge of the processes of respiration and photosynthesis at the cellular and molecular levels and the relationship between them.						
	4	Recognize how the structure of specialized cells relates to their different functions.						
	5	Demonstrate knowledge of mitosis, meiosis, and the cell cycle.						
	6	Demonstrate knowledge of active and passive transport across cell membranes.						
	7	Recognize the structure and function of different biomolecules (e.g., lipids, proteins, carbohydrates, nucleic acids).						
	8	Demonstrate knowledge of the role of enzymes as catalysts in cellular reactions and factors that affect enzyme function.						
B Classification & Characteristics of Organisms								
	1	Demonstrate knowledge of the role of enzymes as catalysts in cellular reactions and factors that affect enzyme function.						
	2	Recognize characteristics of the reproduction, development, and life cycles of representative organisms.						
	3	Demonstrate knowledge of the functions of specialized structures and systems in protists, plants, animals, and fungi.						
	4	Demonstrate knowledge of the structures and functions of human body systems.						
	5	Analyze how organisms obtain, use, and store matter and energy.						
	6	Analyze how organisms maintain homeostasis and fight diseases.						
	7	Demonstrate knowledge of viruses and prions.						
C Concepts & Principles of Genetics and Evolution								

	1	Apply the basic principles of heredity, Mendelian genetics, and the use of Punnett squares and the laws of probability.					
	2	Demonstrate knowledge of the nature of the genetic code and the basic processes of DNA replication and protein synthesis.					
	3	Recognize the methods and applications of genetic engineering.					
	4	Analyze the principles and evidence of biological evolution to explain how species change over time.					
	5	Demonstrate knowledge of major events in the history of life, mass extinctions and the evolution of organisms, including humans.					
D Characteristics of Biomes, Ecosystems & Relationships of Organisms							
	1	Demonstrate knowledge of the characteristics of terrestrial and aquatic biomes, including representative species of plants and animals that inhabit them.					
	2	Recognize strategies used by different organisms to obtain the basic needs for life.					
	3	Analyze the relationships between producers, consumers, and decomposers in a variety of ecosystems.					
	4	Analyze the biotic and abiotic factors that affect population dynamics in ecosystems, including competition, resource availability, and habitat requirements.					
	5	Analyze the cycling of matter and the flow of energy through different types of ecosystems.					
	6	Recognize the ways both human activities and climate change affect ecosystems.					
EARTH & SPACE SCIENCE							
A Physical Geology & History of Earth							

	1	Demonstrate knowledge of Earth's formation, history, and structure, as well as the supporting geologic evidence.						Meteorology: Climate change, story, stories related to elements, northern lights, desertification, monsoon stories Astronomy: Songs and ceremonies, stories, translation of time to place (ex. moon related to time), star navigation, songs
	2	Analyze tectonic processes, the mechanisms driving plate movements, and the landforms and geologic phenomena produced by movement at plate boundaries.						
	3	Demonstrate knowledge of the processes involved in the rock cycle and of the characteristics of igneous, metamorphic, and sedimentary rocks.						
	4	Analyze the constructive and destructive processes that shape Earth's surface, including weathering, erosion, transportation, and deposition.						
	5	Recognize the characteristics and origins of common rocks, minerals, and fossils, as well as mineral, geothermal, and fossil fuel resources.						
	6	Demonstrate knowledge of the effects of continental glaciations during the Pleistocene epoch and the characteristics of glacial deposits.						
B	Characteristics of Hydrosphere, Weather & Climate							
	1	Analyze the physical processes driving the hydrologic cycle (e.g., solar heating, evaporation, condensation).						
	2	Identify the processes and characteristics of marine and freshwater systems, including oceans, rivers, lakes, glaciers, and groundwater systems.						
	3	Analyze coastal processes, the formation of barrier islands, and the characteristics of deltas and estuaries.						

	4	Demonstrate knowledge of the structure and characteristics of the different layers of the atmosphere and the atmospheric and geographic factors that produce different types of weather, including hazardous weather events.						
	5	Analyze weather conditions, maps, and data to predict and explain weather events.						
	6	Demonstrate knowledge of the geographic factors that control regional climate conditions.						
	7	Analyze the causes and effects of current and past changes in global climates on ecosystems, the hydrosphere, coastal processes, and agriculture.						
	8	Recognize the significance of interactions of the ocean and the atmosphere.						
C	Characteristics of Solar System & Universe							
	1	Demonstrate knowledge of the formation of the solar system and the characteristics of planets, asteroids, comets, and planetary satellites.						
	2	Demonstrate knowledge of the apparent motion of objects in the sky and the celestial sphere model.						
	3	Analyze the interactions of the sun, the moon, and Earth and the effects of these interactions on Earth systems.						
	4	Recognize the characteristics and evolution of stars and galaxies, including theories on the origin and nature of the universe.						
	5	Demonstrate knowledge of evidence supporting the current understanding of the solar system and universe and of the technology and methods used to gather that evidence.						

6	Demonstrate knowledge of the role of gravity in the solar system and the universe.						
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I certify that [candidate] has demonstrated sufficient mastery of content knowledge in Integrated Science preparation standards through *work experience and/or cultural practice* as notated in the above matrix and collected in an [name of EPP] approved portfolio: *Verified by EPP program lead (or designated committee/assessment team) in consultation with subject area experts.*

Signed: _____ Printed Name: _____ Title: _____ Date: _____

I certify that [candidate] has demonstrated sufficient mastery of content knowledge in Integrated Science preparation standards through *P-20 teaching experience* as notated in the above matrix and collected in an [name of EPP] approved portfolio: *Verified by a fully licensed school/district level administrator or teacher with at least three year's full-time experience in public education (in the endorsement area, if a teacher).*

Signed: _____ Printed Name: _____ Title: _____ Date: _____

I certify that [candidate] has demonstrated sufficient mastery of content knowledge in Integrated Science preparation standards through *coursework and alternative academic learning* as notated in the above matrix and collected in an [name of EPP] approved portfolio. I further certify as [EPP] that the candidate has demonstrated competencies in content knowledge as required by this Holistic Assessment and will retain this form and the required portfolio. *Verified by university faculty within endorsement area.*

Signed: _____ Printed Name: _____ Title: _____ Date: _____

As a condition of utilizing the Holistic Assessment of Content Knowledge for the puprose of licensure, I authorize TSPC and the EPP from which I completed teacher preparation to request and receive data on my performance and effectiveness on K-12 student learning for a period of no more than three years from my teaching assignment(s) subsequent to licensure. I will assist TSPC and the EPP in obtaining the requested documentation from their employer. *Completed and signed by the candidate.*

Signed: _____ Printed Name: _____ Title: Candidate Date: _____