



Colorado College Curricular Plan

Complete a curricular plan based on the template below. For teams whose members will develop separate curricular resources, each team member should submit an individual curricular plan. For teams who will jointly develop a curricular resource, the team may submit a single curricular plan.

Summary

Describe the curricular resource you/your team developed, including an overview of what teachers and students will do. Include a timetable for the course preparations and for the course. What sort of instructor's guide do you plan to develop to accompany this resource (what guidelines will you provide for other faculty who use the resource you develop)?

Title of the course: **Italy and the Mediterranean: Earth, Sea, and Culture**

The international course examines the interrelationship between the occupants of the Italian Peninsula and the Peninsula's distinctive landscape, geology, and ecology. It focuses on the influence of nature on how people lived in the ancient, Renaissance, and modern periods, and how people perceived and tried to manage nature. Sites for study include Rome and Florence, the Bay of Naples and Venice, with additional short visits to the Maremma in southern Tuscany, Pisa, and Orvieto. By examining three time periods that can be 'read' and retrieved from a common physiographic and urban setting (e.g. Rome, or Venice), the course seeks to provide the means for students to experience the scholarly excitement that derives from intellectual exploration, synthesis and integration, and thereby to instill a passion for interdisciplinary inquiry.

The course syllabus, itinerary, and interdisciplinary objectives (included below) were prepared over the course of the SAIL: Mediterranean Trivium award period (2012-14) and the full course will be offered for the first time in the Summer of 2015. Various of the course activities and learning activities have been implemented in individual courses taught by Ashley, Thakur and Siddoway during the 2013-14 academic year, and these will be integrated in on-campus courses again in 2014-15. The instructor's guide that we will develop and provide for this course will consist of A) an itinerary for an intensive one-month course, B) suggested readings that provide foundational or specialized knowledge, or access to primary sources (English translations), that relate to the interdisciplinary themes, C) explanations/recommendations about how and/or where to introduce the main topics, and how to achieve good communication and clear understanding of the interdisciplinary nature of the course, both for students and for faculty. In addition, D) the guide will contain logistical information that is current in 2014 and 2015. This resource will be provided online as a webpage on the ACM-Mellon SAIL Trivium website, <http://sites.coloradocollege.edu/sail/>.

Learning Goals

What are your learning goals for the interdisciplinary course and the curricular resource? Are there specific skills (e.g. writing, oral presentation, field technology, etc.) that students will be expected to learn? How do you expect this resource to help students learn to do multidisciplinary work?

Drawing upon the perspectives of history, classics and archaeology, and geology, the learning goals for the **Italy and the Mediterranean: Earth, Sea, and Culture** course are to:

1. *Examine how natural phenomena affected/affect society.* The distinction will be drawn between continuous and catastrophic phenomena, for purpose of comparison and contrast.
2. Use primary sources to discover *how individuals and societies affected the environment* in ancient and Renaissance societies, and *to compare those effects to the impacts of contemporary society* on the environment. Primary sources will include rock and sediment exposures, archeological sites, and literature in English translation. Communicate about and discuss the rationale for use of primary materials.

3. Examine domestic objects, art and ritual objects, architecture and urban design, and primary literature sources to determine *how people imagined and understood nature*.
4. Center investigation on three major periods in history: ancient, Renaissance, and contemporary.
5. Educate students and collectively explore the meaning, motivations for, and drawbacks of an interdisciplinary approach.
6. Communicate about and discuss practical aspects of interdisciplinary learning:
 - obtain sufficient breadth, depth and acquaintance with foundational knowledge and methods in each discipline to function at a professional (not amateur) level. Avoid reducing the foundational knowledge, best practices, and intellectual framework of each discipline in order to have acquaintance with multiple disciplines.
 - monitor and record the process in achieving interdisciplinarity, and be conscious of impediments that exist to interdisciplinary work. Track the steps by which we achieve important realizations or discover new knowledge.
 - achieve a degree of balance between disciplinary standpoints and respect/implement the best practices of each discipline
 - the ability to working interdisciplinarily grows with experience. It takes practice to become adept at identifying new relationships among disparate types of information, from which we may attain knowledge.

Context for Use

Describe the types of courses or teaching situations for which this resource is appropriate. For example, what is the ideal educational level and class size? In what setting will it work best (lab, lecture, small group discussion, field exercise, longer project)? How much time is needed?

The design of the course is most suitable for intensive, immersive learning and a one-month format of the type that is employed for J-term, interim, Block Plan, and summer courses at many ACM schools and other liberal arts colleges. The course is intended to be taught on-site in Italy, for students at *sophomore level or higher* who have developed an affiliation or an initial preference for a disciplinary focus within an academic major.

Using geospatial and internet resources, faculty members who wish to offer this course on the home campus could readily do so by making use of GoogleEarth, GeoMapApp and other interactive geospatial resources, together with web-based materials such as the [Google Art Project](#). For an example of the latter, brought to bear on interdisciplinary learning, see our web resource entitled "[Landscape and the imagination in Florence](#)."

An ideal class size would be determined on the basis of faculty to student ratio, with 1 faculty member per six students (or so), and the possibility for students to work on group projects in teams of three or four. Hence, an optimal class size that is guided by three faculty members would be 18 students.

Assessment

Given your learning goals for this resource, how do you propose to assess how well your students accomplish those goals? How might other instructors use or need to adapt this assessment approach?

For assessment of the degree of proficiency with interdisciplinarity that students achieve during the course, we will adapt and apply the [targeted assessment rubric](#) of Mansilla et al. (2009). Specific to our course, we have identified five learning objectives for the course (see list on p. 4), to be developed over 20 days of interdisciplinary inquiry in varied geological, historical, urban and extraurban settings in Italy. Five approaches to learning (p. 4) are prioritized for development and application. The degree to which students fulfill the learning objectives and attain proficiency with the learning approaches will be assessed using the rubric that appears on pages 10-12 of this document. Learning objectives 2 through 4 are, in our view, essential to interdisciplinary inquiry. They serve to instill traits of curiosity, critical thinking and reasoning that are at the core of liberal arts education that lead to tendencies for lifelong learning. Instructors who share this view may apply our rubric as it is or with some adaptation to align with course content.

Course Information

Title: Italy and the Mediterranean: Earth, Sea, and Culture

Colorado College Faculty: Susan Ashley [History], Christine Siddoway [Geology], Sanjay Thakur [Classics, Archeology]

Introduction: The course examines how the singular geological framework and distinctive ecology of the Mediterranean region, and in particular Italy, shaped Classical, Renaissance and modern cultures. Archeological, and documentary evidence in these periods provides a record of the impacts of nature on society, and at the same time demonstrates how people managed, explained, and imagined nature. Meanwhile, the land contains an independent geological and ecological record of both natural processes and human impacts on / transformations of landscapes and ecosystems. The course draws upon these sources in a series of locations that preserve and provide access to ancient, Classical, and Renaissance records, within the framework of contemporary culture. The sites offer ideal circumstances in which to teach and enhance best practices of primary observation, reflection, synthesis and integration, discussion and interpretation from the disciplinary and interdisciplinary standpoints. Primary sites to be visited in the course include Rome, Naples (Vesuvius and Pompeii), Tarquinia/Pittigliano, and Florence, with supplementary excursions to Pisa, the Tuscan countryside, and Venice.

Course Goals and Approach

Learning objectives (including skills and disciplinary approaches to be acquired)

1. Understand the multiple conceptions of the term "Mediterranean."
2. Demonstrate proficiency in the use and understanding of the vocabularies of the disciplines emphasized in the course.
3. Enhance abilities to "read" and analyze landscapes (natural and urban), texts, and images.
4. Increase competence in geospatial, quantitative, and critical reasoning.
5. Cultivate a sensitivity to the ambiguities which result from the study of the remote past, incomplete records, controversial interpretations, and insistent and invasive modern biases.

Approaches

1. Reading, discussing, and writing about the materials and sources central to the course.
2. Observation and analysis of texts, objects, images, rock successions, and landscapes.
3. Geographical information systems as a common platform for information from multiple disciplines.
4. Quantitative measurement for understanding dimensions, scale, and scope of environmental factors.
5. Use of the geological and human time scales.

Outline of the course:

On-site study emphasizes the ancient, Renaissance, and contemporary periods and locations using observational and primary materials which best demonstrate natural continuities and catastrophes in Italy.

- a. Rome: Introduction to the natural setting, the city and its history
- b. Bay of Naples: Volcanic eruptions (mainly in antiquity) and their effects on society
- c. Maremma, Pisa, and Florence: interactions between the landscape and economic, social and political structures (medieval, Renaissance, and modern)
- d. Venice: A case study of nature's impacts on coastal society—past, present, and future

Course syllabus, itinerary, and primary sources

Readings include a combination of primary material, scholarly articles, and monographs.

Day 1: Rome: the landscape: seven hills and a river
Palatine and Capitoline hills and the Tiber
Capitoline Museum

Readings:

Day 2: Building ancient Rome: cosmic and civic design
Colosseum and Forums
Pantheon

Day 3: Supplying Rome
The port: Ostia Antica
Water: Aqueducts, sewers, and fountains

Day 4: From pagan to Christian
The first St. Peters (Vatican scavi)
San Clemente

Day 5: Papal Rome
St. Peters
Castel St. Angelo
Piazza Navona

- Livy *History of Rome* Book I: 1.1-1.17 (selections on the founding of Rome: Romulus and Remus and the hills) [[eText: University of Virginia](#)]
- Ovid, *Fasti* entries for Jan 11, Feb 15, Feb 17, Feb 21, Feb 23, Mar intro, Mar 15, Apr 21, May 9, May 14, June 9 [[Poetry In Translation](#)] [Ovid's poetic calendar ties myth to specific locales in Rome; of interest are how topography and history influence cultural production(s)]
- Juvenal, *Satire* 3 [[Poetry in Translation](#)] [Juvenal's short poetic satire on life in Rome provides a commentary on Rome's topography and monuments]
- Vitruvius, *de architectura* Book 2 Chap.3-7 (inclusive), Book 3 Chap. 2-4 (inclusive), Book 4 Chap. 4-6 (inclusive), Book 5 (all) [[University of Chicago](#)][Vitruvius' work, still influential amongst architects today, describes various building materials and practices, and illustrates how ancient Romans were well aware of the natural world.]
- DiRita, D. & Giampaolo C., "Ancient Rome was Built with Volcanic Stone from the Roman Land," 2006, in [Special Papers](#) or Jackson, Marie D. "Vulcan's Masonry," *Natural History*, 116 (2007): 40-45.
- Alvarez W., *The Mountains of Saint Francis* (Part II), W.W. Norton, 2009, 288 pp. [[Used Books: Amazon](#)]
- Heiken G. et al, *Seven Hills of Rome* (Chapters 1-2), Princeton University Press, 2005, 245 pp.

The stage for the course is set with visits to the Forum and the Capitoline Hill, with faculty presentations on the setting from the perspective of their disciplines. Rome lies at a convergence of geology, development of society, city planning, and monumental building. Just 6 million years of the geological history is sufficient to introduce drastic sea level variations, responsible for both the deposition of impermeable marine clays and incision of the deep ria of the paleo Tibur River, and the 'competition' in volcanism from the Alban Hills and Sabatini Hills. The organization and history of the ancient Roman city, over centuries, is on view from archeological sites and from rich primary literature. The Capitoline in its ancient, medieval, and modern dimensions offers an example of layers of information from the succession of time periods and the possibility to 'read' the monumental expression of civic, political, and religious priorities.

The Pantheon is a second subject of interdisciplinary study: as an architectural wonder made possible by Roman engineering and optimal use of geological resources, and a profound expression of the cosmology of ancient Rome. The logic of the interior structure and design, with repetition and scaling of geometrical elements, reflects the organization of the cosmos, the city, and the human body.

The selection of readings from Livy, Ovid, Frontinus, Juvenal, and Vitruvius and from W. Alvarez, *The Mountains of St. Francis* and G. Heiken, *The Seven Hills of Rome* will be supplemented with study of rock exposures, stone within building blocks, elements of archeological sites, configuration of streets that adhere to ancient streets and

travel corridors. For broader course context, students will also read substantial portions of Fernand Braudel, *The Mediterranean*, and Peregrine Horden, and Nicholas Purcell, *The Corrupting Sea*.

Disruptive Nature and Vanquished Empires

Day 6: Disruptive nature #1
Pompeii
Herculaneum

Day 7: Mt. Vesuvius
Then, later, now

Readings

Horden and Purcell, *The Corrupting Sea*, Part 3, Chapter 8, *Mediterranean Catastrophes*, Section 2, *An Unstable World*, pp. 304ff.
Pliny, *Letters* 6.16 and 6.20 [on the eruption of Vesuvius in AD 79]

Stewart, Doug, "[Resurrecting Pompeii](#)," *Smithsonian Magazine*, 2006

Barnes, K., "[Europe's Ticking Time Bomb](#)," *Nature*, v. 473 (12 May 2011), p. 140-141

Poehler, E., "The Drainage System at Pompeii: Mechanisms, Operations and Designs," *Journal of Roman Archaeology* 25 (2012): 95-120.

Wayman, Erin, "[The Secrets of Ancient Rome's Buildings](#)," *Smithsonian Magazine*, 2007.

Wallace-Hadrill, A., "The Monumental Centre of Herculaneum: In Search of the Identities of Public Buildings," *Journal of Roman Archaeology* 24 (2011): 121-160.

Mt. Vesuvius provides an extraordinary view of the Bay of Naples and opportunity to appreciate the scale of the volcanological system that spans the entire northern half of the bay from Misenum and Pozzuoli to the partial-rim of Mt. Somma, that dwarfs the flank of Vesuvius. Features of the rock and stratification inside the crater reveal much of the geological history from 1890-present. Visits to Pompeii and Herculaneum vividly illustrate the manner of life in the agricultural and 'coastal resort' settings, with notable differences in what the archaeological records reveal about the two towns, and in the contrasting approaches to archeological preservation and resource allocation to the two sites. In these locales, the class will explore the question of how people explain natural crises, in literature, art, politics, economics, and by other means. How do catastrophic events relate to assumptions about an ordered cosmos?

Day 8: Vanquished Empire: the Etruscans
Tarquinia, Cerveteri
Land and water: the Maremma

Day 9: Disruptive nature #2
Pitigliano: volcanic hills
Lardarello: geothermal energy

Day 10: The Sea: Pisa
Roman port
Cathedral, Tower, Baptistry
Arno River

Masters, R. 1999, *Fortune Is a River: Leonardo Da Vinci and Niccolò Machiavelli's Magnificent Dream to Change the Course of Florentine History*, Chapters 1-3, Chapters 4-6, Chapters 7-9, Chapters 9-11, Plume Press, 278 pp.

Nappi, G. et al., 1994, Plinian fall deposits from Vulcini Volcanic District (Central Italy), *Bulletin of Volcanology*, v. 56, pp 502-515.

Sarti, Giovanni, Bini M. & Giacomelli S., "[Correlations Between Landscape, Geology and the Growth and Decline of Pisa \(Tuscany, Italy\) Up to the Middle Ages](#)," *Il Quaternario—Italian Journal of Quaternary Sciences*, 23 (2010): 311-322.

Slayman A, "[A Cache of Vintage Ships](#)," 52 (1999)

Exploration of human interventions with nature are the theme for interdisciplinary work in the Grosseto province of southwestern Tuscany. Pitigliano offers a rich geological and archeological record for the Etruscans, their use of fundamental natural resources, and distinctive features of their society. The coastal 'park' and artificial forest of the Maremma bear testimony to the priorities and efforts to preserve nature by ruling classes of Italy. The Port of Pisa, much changed since Roman and Renaissance times, is complemented by study of the Campo dei Miracoli. Topics

include the origin and configuration of the initial Roman settlement, the construction of the cathedral and the baptistry, a review of the geological context for the city and port, and a study of the efforts to control the lean of the Tower of Pisa.

Geospatial tools will be introduced and brought in to use during this week, via a workshop activity “[Geospatial platforms for interdisciplinary inquiry](#),” using the digital terrain map of Italy, GoogleEarth, and GeoMapApp. As well as standard applications involving maps and physical geography, students will work in small teams to develop one unconventional application of these tools, for example a geospatial analysis of the quantity of physical materials used in the creation of a stained glass window, with interpretation of the probable source sites for glass, pigments, lead and tin, stone, etc. Complementary online interactive resources and geospatial databases, such as the [Stanford Geospatial Network Model](#) of the Roman World, will be used.

Throughout Week 2: ‘companion’ studies in Interdisciplinary inquiry throughout the week

- Introduction to the approach by Faculty; Small-group Readings and Synthesis on the Approach
- Working in small groups, students read, reflect, and synthesize material from readings about interdisciplinary inquiry and from examples of investigative projects.

^Small-group Presentations to the Class / Discussions among full class

Readings:

Dahlke et al., [Theorizing Interdisciplinarity](#), Center for Science in Society, Bryn Mawr College, © 1994-2014.

Mansilla, V.B. & Dawes, E. (2007). Targeted Assessment of Students’ Interdisciplinary Work: An Empirically Grounded Framework Proposed: *Journal of Higher Education*, 78 (2), pp. 215-237

McCoy, Shannon K. & Susan K. Gardner, “[Interdisciplinary Collaboration on Campus: Five Questions](#),” November-December 2012.

Wiggins G. and J. McTighe, [Understanding by Design](#) [2nd ed.], Pearson Publishing, 2005, 384 p. (Chapter 1, recommended). See also: [UdB](#).

In addition: internet sources to be identified, read, and contemplated in respect to assigned materials.

FLORENCE

- Day 11: Roman Florence
The Roman settlement and Fiesole
Archaeology museum
- Day 12: Building the Renaissance city
- The river, streets, centers of power (Palazzo
Vecchio, Bargello, Orsanmichele)
- Centers of faith (San Miniato, the Baptistry, the
Duomo)
- Day 13: Landscape imagined and managed
- Uffizi Gallery

READINGS

- Bruni, Leonardo, *Panegyric to Florence*
- Burckhardt, Jacob, *The Civilization of the Renaissance in Italy*, Pt. 4, *The Discovery of the World and of Man* (parts 1-3) [Several versions available online at Project Gutenberg: [HTML](#) | [ePub](#) | [Kindle](#)] [seeing nature as an object]
- Alberti, Leon Battista. *On Painting*, Prologue, Books 1-3. [[Cambridge Books Online](#)][[Various Formats: Amazon](#)]. Open access edition [here](#). [the mathematics of perspective]
- DaVinci, Leonardo, *On Painting* (edited by Martin Kemp), 1989. Part IV, The Depiction of Nature, pp 159-191. [the techniques of capturing nature in one dimension]
- Cosgrove, Denis, "The Geometry of Landscape: Practical and Speculative Arts in Sixteenth-century Venetian Land Territories," 254-276 in Cosgrove, Denis and S. Daniels, eds., *The Iconography of Landscape*, 1988. [how mathematics, perspective, and neo-Platonism influenced reclamation plans]
- Selected readings from: Battista Vai, Gian and Caldwell, W. Glen E., "The Origins of Geology in Italy" *GSA Special Paper 411*, 2006, pp. 31-42.

Florence is studied as a site of ecclesiastical, economic and political power, from the standpoint of Roman, Renaissance, and 20th century. An introduction to the City will be provided by a far-ranging walking tour of Florence. The foot trip visits sites of evidence for the religious (Duomo, Baptistry), economic (Orsanmichele), and political (Palazzo Vecchio and Piazza della Signoria) centers of late medieval and Renaissance Florence. A project will involve observation and use of the 'primary resource' of a well-preserved late medieval street, to gain understanding of the private lives and social structure in the medieval period, and then, more broadly, the role of the Arno river in the economy in medieval, renaissance and modern times. In the Boboli Gardens (looking south) and the Bardini Gardens (looking north), students will gain direct perspectives on the geospatial configuration and landscape context for the Arno River, Appenines, and Tuscan hill country.

One day is devoted to visions of nature and depictions of nature, thorough study of landscape paintings in the Uffizi Museum in Florence. A selection of works illustrate artists' use of natural elements for cultural representations. Readings include: selections from Leonardo da Vinci, *Notebooks*; Leon Battista Alberti, *On Painting*; Jacob Burckhardt, *The Civilization of the Renaissance in Italy*; David Branagan, article on Renaissance artists' representation of rock formations in the landscape.

Excursion to Orvieto

Day 14: City on the hill: Orvieto Land reclamation: Renaissance and modern del Monaco et al., "[Field Guide to Orvieto, Civita de Bagnioreggio, & Ancona](#)," 2nd World Landslide Forum, 2011, pp. 1-17

Orvieto offers a second example of a hill town that has contains records of urban development spanning 3000 years, within an opportune geological environment. Originally inhabited by the Etruscans, and later used as a fortified refuge by late Renaissance popes, the mode of human existence spans the humble to the elaborate and ornate. The elements of the Duomo – its extraordinary facade that recounts the Book of Genesis, a spare interior with alabaster windows that contrasts with the intense color and strong themes of the Chapel of San Brizio by Luca Signorelli—offer a wealth of material for contemplation of the interrelation between humans, nature, deity, and human intellect. Close access to the influence of geological materials on the urban development, from Etruscans to present, is offered by "Orvieto underground," a tour of subterranean excavations beneath Orvieto.

Wetlands and water management near Florence

Day 15: Land reclamation: Florence-Renaissance and modern Bartolini, A., 2007, [La Riserva Naturale del Padule di Fucecchio](#).
Masters, R., *Fortune Is a River : Leonardo da Vinci and Niccolò Machiavelli's Magnificent Dream to Change the Course of Florentine History*, (New York: Free Press, 1999) Chapter 2.
Museo Galileo, [The Florence and Pistoia Canal: deviating the Arno through Prato and the Val di Nievole](#)

The ecology and geological hazards of the Arno River basin and surrounding hills of Tuscany offer the means to examine modern human agricultural landscapes as part of the Mediterranean ecosystem, and explore the long history of human intervention and transformation of the landscape. A Renaissance example of the engineering of nature is da Vinci and Machiavelli's plans to divert the Arno River, the subject of Masters' book. Along with the urban river corridor, extraurban sites are studied. The Padule di Fucecchio is the largest internal wetland in Italy, that provides a context for interdisciplinary study of the development and use of the wetlands from the Middle Ages to the Present. St. Clair described the ecological significance of marshlands, with particular reference to Fucecchio.

Two-day excursion: City on the sea: Venice

Day 16: City on the sea: Venice
St. Marks, Palazzo Ducale
Arsenal, Naval Museum
Cosgrove, Denis, Platonism and practicality: hydrology, engineering, and landscape in sixteenth-century Venice, in Cosgrove D. and Pitts G., *Water, Engineering, and Landscape*, 1990.

Day 17: Disruptive nature #3
The terra firma
Staying afloat
Brambati, A. et al., 2003, [The Lagoon of Venice](#): geological setting, evolution, and land subsidence, Episodes, v. 26 (3), p. 264-268.

Day 18: Group presentations on Saving Venice
Working in small groups, students will draw upon multiple disciplinary standpoints to develop rationale, urban designs, technological solutions, and recommendations for addressing issues of coastal hazards and environmental/ecological change in the Venice Lagoon.

Return to Florence

Day 19 The “new” Florence: Interdisciplinary research and presentation by student teams, augmented by material from faculty members

Capital of Italy: 1864-70

Taming the Arno: 1966 and beyond

Twenty-first century patterns: Prato

Travel to Rome

Day 20: Modern Rome: maintaining the old, containing the new EUR. Visit to St. Peters, with emphasis on the construction, design, populace, and significance of the succession of churches on this site in the ancient, medieval, late Renaissance, and modern periods. Powerful support for the historical progression is provided by a guided visit to the archeological excavations beneath St. Peters Basilica, followed by a climb to the top of the cupola to observe the sweep of the city and the surrounding hills.

Conclusion of course

Interdisciplinary resources and further information about Earth, Sea and Culture in Italy and the Mediterranean may be found at: <http://sites.coloradocollege.edu/sail/>

Interdisciplinary inquiry assessment of course learning objectives

Siddoway, C., Ashley, S., and Thakur, S. 2014

The highest score 4 in each category is 4. The highest total score possible is 40, and lowest score possible is 10.

	Score: 4	3	2	1
Understand the multiple conceptions of the term "Mediterranean."	Comprehends the term 'Mediterranean' as having composite meaning derived from history, geography, climatology, geology, anthropology, archaeology and ecology	Identifies the term 'Mediterranean' as a place-based social-political construct associated with strong cultural identities of small population groups	Associates the term 'Mediterranean' with diverse language groups and nations found around the perimeter of the Mediterranean Sea	Associates the term 'Mediterranean' with a specific geographic feature or physical/climatic region.
Demonstrate proficiency in the use and understanding of the vocabularies of the disciplines emphasized in the course.	Understands the relationship between vocabulary knowledge and content knowledge. Demonstrates access to concepts that derive from understanding of specialized vocabulary from three or more disciplines.	Proficient in use of vocabulary from at least three disciplines, leading to integration of foundational knowledge and content from at least two disciplines.	Reasonable degree of familiarity with fundamental vocabulary from relevant disciplines, allowing access to foundational knowledge and content for at least two disciplines.	Lack of familiarity with fundamental vocabulary from relevant disciplines, that inhibits the understanding of content. Unable to access nor conceive of higher order concepts that derive from understanding of specialized vocabulary.
Enhance abilities to "read" and analyze landscapes (natural and urban), natural features or objects, texts, and images.	Demonstrates ability to identify meaningful elements, patterns and interrelationships, and develop original explanations of meaning, process, or sequential development based on these, drawing upon a context derived from multiple disciplines.	Able to identify features or patterns that provide a basis for one or multiple original interpretations. Able to place in the context of one or two academic disciplines and own experience.	Able to identify obvious elements for description and interpretation, in order to question about these elements.	Unable to identify elements that guide observation and provide a basis for inquiry or interpretation. Incapable of analysis from which meaning can be derived.
Increase competence in geospatial, quantitative, and critical reasoning.	Develops a method and performs a quantitative or critical analysis; places disparate information within a geospatial or spatial-temporal context that advances understanding.	Develops a method and sets up a means to solve a quantitative or critical reasoning problem. Places disparate information within a geospatial or spatial-temporal context, in preparation for analysis.	Geospatial and quantitative parameters, and/or rationale is obtained from source(s) rather than own discoveries and insights, without any evaluation or interpretation.	Does not provide nor apply quantitative or critical reasoning, and does not present information within a geospatial framework.
Cultivate a sensitivity to ambiguities that arise from the study of the remote past, incomplete records, controversial views, and insistent and invasive modern biases.	Strives to recognize and engages in deliberation about multiple standpoints on an object of study. Able to identify historical, political, cultural, environmental, or temporal context or conditions that influence and complicate the meaning and significance of the object. Identifies own and others' assumptions and relevant contexts before arriving at a position.	Capable of identifying and explaining multiple standpoints on an object of study that may inhibit or promote full understanding, and able to accept ambiguity.	Displays an understanding of factors that inhibit full understanding, due to changes in sociopolitical or cultural framework, incomplete records due to passage of time and deterioration of physical materials, and a juxtaposition of modern viewpoints upon historical objects.	Shows no ability to identify evidence or information that may be interpreted in more than one way, and no appreciation for alternative standpoints.

Assessment of approaches used for inquiry		Siddoway, C., Ashley, S., and Thakur, S. 2014		
Reading, discussing, and writing about the materials and sources central to the course.	Communicates, organizes and synthesizes information from sources to achieve a cognitive breakthrough, that can be supported with clarity and depth of documentation from sources.	Communicates, organizes and synthesizes information from sources, leading to realizations of interrelationships between disciplinary standpoints.	Able to communicate and organize information from sources. Synthesis of information is preliminary or incomplete.	Information from sources is fragmented, incomplete, or used inappropriately. Unable to discuss content, synthesize and integrate material, or identify disciplinary standpoint.
Observation and analysis of texts, objects, images, rock successions, and landscapes.	Able to systematically and methodically observe, analyze and offer original interpretations of the subject of study, drawing upon a context derived from multiple disciplines.	Able to make primary observations and propose one or multiple original interpretations. Able to place in the context of one or two academic disciplines and own experience.	Able to make primary observations but inexperienced with original interpretation. Able to relate descriptive elements to own experience or to others' interpretations (i.e., readings) as a form of context.	Not able to make primary observations or identify an avenue to inquiry and interpretation. Not able to identify a context or linkage to personal experience or academic source.
Geographical information systems as a common platform for information from multiple disciplines.	Able to use GIS as an organizational framework for representation of information from diverse disciplines, applied to a new problem, and use this as a basis for collective intellectual effort and inquiry.	Able to use GIS as an organizational framework for representation of information from diverse disciplines, applied to a new problem.	Achieve basic skills in use of GIS for applications provided, and basic knowledge of the use of GIS for collective inquiry involving multiple disciplinary perspectives.	Demonstrates no proficiency in use of GIS and a lack of understanding about the use of the tool for collective inquiry involving multiple disciplinary perspectives.
Quantitative measurement for understanding dimensions, scale, and scope of environmental factors.	Able to measure, determine dimensions and scale, devise a method to address complex environmental factors, and achieve a solution. Calculations related to the problem are correct and lead to a successful completion of the problem.	Able to measure and determine dimensions or scale. Able to identify a method to address complex environmental factors but not able to carry through with a solution.	Measurements related to the problem are attempted but contain errors and are insufficient to determine parameters of dimension or scale. Partial or incomplete evaluation of environmental factors.	Unable to apply measures and calculate dimensions or scale. Unable to identify and determine the means to assess complex environmental factors.
Use of appropriate terminology from disciplines, including geological and human time scales.	Demonstrates competency in correct use of specialized terminology that demonstrates understanding of foundational knowledge and fundamental principles in three or more disciplines.	Demonstrates competency in correct use of specialized terminology that demonstrates knowledge of fundamental principles in at least two disciplines.	Effective use of specialized terminology that demonstrates an acquaintance with and ability to apply foundational knowledge in at least two disciplines.	Fails to use specialized terminology that is emblematic of an appropriate degree of education in/about the disciplines offered in the course.

Boix Mansilla, V., Dawes Duraisingh, E., Wolfe, C.R., & Haynes, C. (2009). Targeted Assessment Rubric: An Empirically Grounded Rubric for Interdisciplinary Writing. *The Journal of Higher Education* 80 (3) 334-353.

Targeted Assessment Rubric for Interdisciplinary Writing

Category 1: Purposefulness

Guiding Question	Naïve	Novice	Apprentice	Master
1.1. Does the student’s framing of the problem invite an integrative approach?	The paper does not contain an identifiable purpose or the purpose is unclear.	The paper contains a discernible purpose but it is not clear that this purpose calls for an integrative approach. <i>Or</i> The student does identify a problem that calls for an integrative approach but the purpose of the paper is not clearly stated or the purpose is unviable.	The student clearly states a purpose that calls for an integrative approach. However, the student offers no clear rationale or justification for taking this approach. <i>Or</i> The purpose of the paper appears somewhat ambitious.	The student clearly states a purpose that calls for an integrative approach and provides a clear rationale or justification for taking this approach.
1.2. Does the student use the writing genre effectively to communicate with his or her intended audience?	There is little sense of an academic genre being used and the intended audience is unclear.	An academic genre is discernible but multiple violations of the genre (e.g., organization, tone, referencing, vocabulary) limit the student’s ability to communicate with the intended audience. <i>Or</i> The writing is not fluid. It requires multiple readings.	An academic genre is clear and generally adhered to. The student is obviously aware of the intended audience, which often represents more than one discipline. The paper reads fluidly. No innovation within the genre is visible or if there is any attempt at innovation it is not effective. The paper may include minor errors in tone, mechanics, and referencing.	An academic genre is clear and consistently adhered to. The student is obviously aware of the intended audience, which often represents more than one discipline. Any innovation within the genre is effective and deliberate.

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Table A2

Category 2: Disciplinary Grounding

Guiding Question	Naïve	Novice	Apprentice	Master
2.1. Does the student use disciplinary knowledge accurately and effectively (e.g., concepts, theories, perspectives, findings, examples)?	<p>A disciplinary knowledge base is not discernible in the sense that the ideas and information included do not stem from any particular disciplinary tradition.</p> <p>Misconceptions and folk beliefs abound. In some cases, jargon is used with little evidence of understanding.</p> <p><i>And/or</i> the student misuses sources in a major way—e.g., non-credible sources, misunderstanding the meaning of source(s), relying too heavily on one source.</p>	<p>The student uses disciplinary concepts, theories, perspectives, findings, or examples in simplistic, general, or mechanical ways—as in the “textbook” version of a discipline. Key claims are sometimes not supported, or concrete disciplinary examples are disconnected from key claims.</p> <p>Some misconceptions and unwarranted use of jargon may be present.</p> <p>Sources are used pro-forma.</p>	<p>Concepts and theories are used effectively in accordance to their disciplinary origins, in ways adopted by disciplinary experts. Theories and generalizations are consistently supported with examples or findings from the disciplines involved.</p> <p>Conversely, concrete cases and examples are interpreted with disciplinary concepts and theories.</p> <p>Relevant and credible sources are used intelligently to advance the argument of the piece, though the paper may have too many unnecessary sources, or key sources may be missing.</p>	<p>In addition to the qualities outlined at Level 3, a well organized network of concepts, theories, perspectives, findings, and examples within one or more of the selected disciplines is clearly visible.</p> <p>Some insightful new examples, interpretations, or responses within the selected disciplines may be present.</p> <p>There is sophisticated use of sources. The sources used are relevant and credible and integrated thoughtfully and purposefully to advance the student’s argument.</p>
2.2. Does the student use disciplinary methods accurately and effectively (e.g., experimental design, philosophical argumentation, textual analysis)?	<p>The student shows little to no awareness of the methods, habits of mind, and validation criteria by which knowledge is constructed and verified in the disciplines.</p> <p>Opinions and information summaries are presented as matters of fact.</p>	<p>The student shows awareness of or uses disciplinary methods and modes of thinking in one or more of the included disciplines, but employs them mechanically, superficially, or algorithmically.</p> <p>There may be oversimplifications and misconceptions about methods (e.g., if someone assumes statistics results are true).</p>	<p>The student accurately employs methods, modes of thinking (e.g., ways to select evidence or construct causal accounts), and validation criteria to construct knowledge in one or more of the selected disciplines.</p>	<p>The student accurately employs methods, habits of mind, and validation criteria to construct knowledge in one or more of the selected disciplines.</p> <p>He or she does so effectively, exhibiting language that describes the constructed nature of disciplinary knowledge (e.g., the provisional nature of insights, the limits of generalizations, the multiplicity of interpretations).</p>

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Table A3

Category 3: Integration

Guiding Question	Naïve	Novice	Apprentice	Master
3.1. Does the student include selected disciplinary perspectives or insights from two or more disciplinary traditions (presented in the course or from elsewhere) that are relevant to the purpose of the paper?	<p>The paper shows no evidence that <i>disciplinary</i> perspectives are used to address the paper’s purpose.</p> <p>Multiple perspectives or points of view may be considered but these do not represent <i>disciplinary</i> views and/or are not clearly related to the paper’s purpose.</p>	<p>The paper includes two or more relevant disciplinary perspectives or fields but the connections between the included disciplinary insights and the purpose of the work are superficial or unclear.</p> <p>Crucial disciplinary perspectives may be missing.</p>	<p>The paper includes two or more relevant disciplines or fields. Selected disciplinary insights are clearly connected to the purpose of the work.</p> <p>Disciplinary perspectives that are tangential to the purpose may be present, or relevant perspectives missed.</p>	<p>The paper includes two or more relevant disciplines or fields. Selected disciplinary insights are clearly connected to the purpose of the work.</p> <p>No unrelated disciplinary insights appear and no crucial perspectives are missing.</p> <p>If the paper includes some tangential perspectives which are, however, original it should be considered Level 4 for this criterion.</p>
3.2. Is there an integrative device or strategy (e.g., a model, metaphor, analogy)?	<p>The student may explore the topic in a holistic way but connections are unclear and there is no obvious sense of integration.</p>	<p>The student may explore the topic in a holistic way, making valid connections across disciplinary or field perspectives; however, insights from different perspectives are not integrated coherently or effectively.</p> <p>In some cases, disciplinary concepts, theories, perspectives, findings, or examples are placed side by side; connections and analogies are made but no overall coherent integration is discernible.</p>	<p>An integrative device (e.g., a leading metaphor, a complex causal explanation) clearly brings disciplinary insights together in a generally coherent and effective way.</p>	<p>A novel, imaginative, or well-articulated integrative device (e.g., a leading metaphor, a complex causal explanation) is used to bring disciplinary insights together in a coherent and effective way.</p>
3.3. Is there a sense of balance in the overall composition of the piece with regard to how the student brings disciplinary	<p>The paper shows an imbalance in the way particular disciplinary perspectives are presented in light of the purpose of the work</p>	<p>The student attempts to balance perspectives but builds this on artificial or algorithmic grounds rather than substantive ones</p>	<p>Disciplinary insights in the paper are generally balanced on substantive grounds in light of the purpose of the work.</p>	<p>Disciplinary insights are delicately balanced to maximize the effectiveness of the paper in light of the purpose of the work.</p>

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perspectives or insights together to advance the purpose of the piece?	(e.g., particular disciplinary perspectives are given disproportionate weight for no obvious reason).	(e.g., giving equal weight to each disciplinary perspective studied irrespective of its substantive relevance to the problem at hand).	However, one or more aspects of the argument may be weakly addressed.	The integration is elegant and coherent and there are no distractions in the building of the argument.
3.4. Do the conclusions drawn by the student indicate that understanding has been advanced by the integration of disciplinary views?	The student attempts to make connections across different perspectives but these are unrelated to the apparent purpose of the paper.	Minor efforts at integration are present. Or a language of integration is present but is used mechanistically to yield minimal advancement toward the intended purpose.	The student makes a valid integration of disciplinary insights to generate understandings linked to the purpose of the paper. However, some obvious opportunities to advance the purpose of the paper are overlooked or undeveloped.	The student takes full advantage of the opportunities presented by the integration of disciplinary insights to advance his or her intended purpose both effectively and efficiently. The integration may result in novel or unexpected insights.

Table A4

Category 4: Critical Awareness

Guiding Question	Naïve	Novice	Apprentice	Master
4.1. Does the student show awareness of the limitations and benefits of the contributing disciplines or how the disciplines intertwine?	There is no awareness of the differing contributing disciplines or fields or their benefits or limitations (e.g., the topic is only approached from a commonsense or very general standpoint).	There is awareness of which disciplines are being used but there is no or only brief discussion of the limitations and/or benefits of the disciplinary contributions. There may be some misconceptions about how the disciplines are being used.	The benefits and/or limitations of the differing contributing disciplines or fields are sufficiently and clearly discussed. Some of the points made may be general or obvious.	The benefits and/or limitations of the differing contributing disciplines or fields are discussed clearly, insightfully, and in relationship to one another (e.g., students not only describe individual contributions but highlight how views complement, balance, add empirical grounding or put into question insights from other disciplines included in the work).
4.2. Does the student exhibit self-reflection?	The student does not consider the strengths and limitations of his or her own paper. Ideas are presented at face value without skepticism or reflection.	Comments on the strengths and limitations of the paper and its integrative approach seem mechanical, superficial, or in passing. Ideas are mostly presented at face value without skepticism or reflection.	There is sufficient comment on the strengths and /or limitations of the paper and its integrative approach, although the points made may be general or obvious.	There is consistent awareness of the strengths and limitations of the paper and its integrative approach. A tentative tone is adopted and alternative integrative approaches may be considered.