



ENVS-100: HUMANS AND SCIENTIFIC INQUIRY

Also listed as: ENVS-100H

Effective Term

Fall 2024

BOT Approval Date

06/08/2023

Discipline

ENVS - Environmental Studies

Course Number

100

Course Title

Humans and Scientific Inquiry

Short Title

Humans and Sci Inquiry

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

3.00

Total Units

3.00

Hours

Lecture Contact Hours

48-54

Out of Class Hours Lecture

96-108

Total Contact Hours

48.00 - 54.00

Total Out of Class Hours

96-108

Total Student Learning Hours

144-162

Distance Education

Yes

Distance Education

Distance Education Type

Both Fully Online and Hybrid Online

Does the DE also apply to the Honors section?

Yes



Honors component will meet synchronously (face-to-face or moderated through online technology such as Zoom)

Fully Online Delivery Requirements:

- a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course
- b. Any planned face-to-face meetings, such as an orientation or study session, must be optional
- c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods:

- Orientation - Students must be oriented to the online and face-to-face portions at the start of the course.
- Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc.
- Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction.
- MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students.
- Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS.
- Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Honors / Non-honors

ENVS-100H

C-ID (Admin Only)

CB 00

CCC000528956

Course Title

Honors Humans and Scientific Inquiry

Approved Cal-GETC Area

AREA-5A

Approved Second Cal-GETC Area

Approved Third Cal-GETC Area

Catalog Description

This course surveys the major branches of science to provide a broad framework for understanding how humans interact with the physical and biological world. The principles of scientific inquiry are used as the basis for thinking critically about contemporary issues impacting humans and the planet.

Codes

TOP Code (CB 03)

0301.00 - Environmental Science

CIP Code

03.0104 - Environmental Science.



Repeatability Code

No

Grading Option

Letter grade OR P/NP

GE Information

Check GE Types Requested

AA/AS A - Natural and Physical Sciences

Cal-GETC Areas

Approved Cal-GETC Area

AREA-5A

Learning Objectives

Learning Objectives

Learning Objective

1. Describe the scientific method and explain how it is related to the major scientific disciplines in the physical and life sciences.
2. Compare and contrast the physical with biological sciences.
3. Evaluate the contributions of different branches of science to human achievement and consider their impacts on different ethnicities, communities of color, genders and abilities.
4. Synthesize the fundamental concepts of chemistry as they relate to the cycling of matter in organisms and systems.
5. Describe energy flow through ecological systems.
6. Compare the environmental concerns surrounding major energy sources and evaluate the environmental justice issues related to their extraction and use.
7. Integrate the main concepts and themes of the life and physical sciences as they pertain to the organization of living systems at a cellular, organismal, population and community level.
8. Describe and evaluate the effect of geographical and geological processes as they relate to humans and technology development.
9. Describe, evaluate, and differentiate between the major scientific contributions of the U.S. and other countries worldwide and synthesize and speculate on their effect on global political, social and economic decisions that impact humankind.

Honors Objectives

- Formulate original thinking and creativity in addressing fundamental scientific principles as they relate to the human experience in the biosphere and in the universe.
- Apply critical thinking skills to produce rigorous analyses of particular environmental issues.
- Analyze the complexities of scientific solutions that must incorporate social and economic obstacles to their implementation.
- Conduct individual research and analysis resulting in the development of a research project based on independently collected data (or open-source data sets).
- Synthesize well-considered positions on controversial issues relating to the impacts of human actions on the biosphere.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Students will describe the scientific method and explain how it is related to the various traditional sciences of physics, chemistry, biology, geology, geography and anthropology.
2. Students will evaluate the contribution of different branches of science to the technological achievements of humans.
3. Students will compare and contrast physical sciences with biological and earth sciences.
4. Students will evaluate and synthesize diverse sources of evidence to draw valid conclusions.

Program Learning Outcomes

Learning Outcome

Students will explain how scientific knowledge is obtained and verified.

Students will evaluate the cycling of matter and the flow of energy in environmental systems.

Students will achieve basic environmental literacy.

Students will think critically about environmental issues by drawing on an understanding of scientific principles.

Students will explore the ethical and social considerations inherent in environmental science.

Students will apply the most current environmental discoveries and regulations to contemporary situations.

Institutional Learning Outcomes

Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.

Scientific Awareness: The student will apply the scientific method of inquiry to assess potential solutions for real-life challenges by employing science-based knowledge and methodologies in daily life.

Content

Course Lecture Content

1. Science as a Way of Knowing
 - a. Process of Science
 - b. Historical Perspectives from Diverse Cultures
 - c. Contributions to scientific knowledge from diverse cultural traditions
2. The Ordered Universe
 - a. Modern Astronomy
 - b. Mechanics
 - c. Laws of Motion and Gravity
 - d. Contributions of modern astronomers from various backgrounds
3. Energy
 - a. Laws of Thermodynamics
 - b. Energy transfer in natural systems
 - c. Heat Transfer
 - d. Magnetism and Electricity
 - e. Electromagnetic Spectrum
 - f. Fundamental Forces
 - g. Sources of energy and environmental justice
4. Atoms
 - a. Structure of the Atom
 - b. Matter and Light
 - c. Quantum Mechanics
 - d. Radioactivity
5. Chemical Bonds
 - a. Electron Shells
 - b. Types of Bonds
 - c. States of Matter
 - d. Toxicology and chemical pollution
 - e. Contributions of modern chemists from various backgrounds
6. Properties of Matter
 - a. Physical and Chemical Properties of Materials
 - b. Energy and Materials
 - c. Silicon Revolution
 - d. disproportionate benefits of advances in material science to diverse cultural groups
7. Theory of Relativity
 - a. Speed of Light
 - b. Time Dilation
8. Cosmology

- a. Energy and Stars
- b. Variety of Stars
- c. Evolution of the Universe - Big Bang
- d. Our Solar System
- 9. The Earth
 - a. Geological Time
 - b. Plate Tectonics
 - c. Volcanoes
 - d. Rocks and Minerals
 - e. Natural disasters, impacts on human populations, and environmental racism
- 10. Cycles of the Earth
 - a. Weather – Atmospheric Cycles
 - b. Hydrologic Cycle
 - c. Rock and Mineral Cycles
 - d. Climate change and climate justice
- 11. Molecules of Life
 - a. Organic Chemistry
 - b. Carbohydrates and Lipids
 - c. Proteins and Nucleic Acids
- 12. Strategies of Life
 - a. Organization of Living Things
 - b. Strategies of Living Things
 - c. Community ecology
 - d. Urban ecology, green spaces and environmental justice
- 13. The Living Cell
 - a. Cellular Structure and Organization
 - b. Photosynthesis
 - c. Cellular Respiration
- 14. Genetics
 - a. Classical Genetics – Mendel
 - b. Cell Division and Reproduction
 - c. Modern Genetics
 - d. Human Genome and Genetic Medicine
 - e. Human Diversity and Common Origins
 - f. Evolution
 - g. Gene editing and new frontiers
- 15. Chemical Evolution
 - a. Macro and Microevolution
 - b. Natural Selection
 - c. Contributions of modern geneticists from various backgrounds
- 16. Physical Anthropology
 - a. Human Evolution
 - b. Comparative Human Anatomy
- 17. Ecology
 - a. Populations and Communities
 - b. Human Population Growth
 - c. Ecosystems
 - d. Environmental Science and Environmental Justice

Honors Content

The honors component of the course will cover the same content as ENVS 100. Additionally, Honors students will investigate a selected topic to a much greater depth than students in ENVS 100.

Honors assignments will require students to generate their own data or utilize open-source data sets to investigate a topic relevant to humans and their interaction with the environment at a level that goes beyond the standard library research paper. Students will work under the guidance of their instructor to determine the best analytical approach to understanding the chosen topic. Students will work within the parameters of the content and themes of the course, which include major scientific principles with broad applications.

They will identify a specific topic related to one of these themes, and conduct an in-depth research assignment. Examples of possible topics include, but are not limited to:

- human impacts on biogeochemical cycles and resultant changes to the biosphere
- the application of the laws of thermodynamics to building sustainable systems at a variety of scales
- the impacts of chemical pollution on communities of color
- disproportionate impacts of light pollution
- maintaining genetic diversity in urban ecosystems
- comparing traditional ecological knowledge (tek) with western scientific inquiry
- economic impacts of climate change

Methods of Instruction

Method

Discussion

Integration

Large and small group discussions on a variety of natural and social science issues as they relate to the study of science and human inquiry. Discussions will center on issues that demonstrate the unequal distribution of the benefits of scientific achievement across diverse groups of people. Students will be encouraged to reflect on these inequities and consider the relationship to environmental and social justice.

DE Adaptations for MOI

Student discussion will be achieved via asynchronous communication using the online discussion forum feature of the course management system.

Method

Group Projects

Integration

Critical thinking activities will focus on case study analysis of interactions of physics, chemistry, biology, and other environmental science disciplines as they relate to current scientific topics.

DE Adaptations for MOI

Group projects will be facilitated using subgroups within the discussion tool in the Course Management System. Students can also meet using accessible video conferencing software to work together and communicate.

Method

Papers and Reports

Integration

Students will review current research related to the interactions between humans and the abiotic and biotic aspects of their environment and synthesize these materials in a written critique.

DE Adaptations for MOI

Independent review and analysis of environmental research will draw upon both traditional print sources as well as web-based sources, including digital media made available by the MSJC library, and will be synthesized in written critiques. Necessary sources may be posted in the CMS by the instructor or students may be required to search for sources using the online repositories accessible through the MSJC library's online portal.

Method

Lab Activities

Integration

Hands-on activities and demonstrations of scientific principles, the scientific method, and environmental science processes and applications.

DE Adaptations for MOI

Demonstrations of ecological principles and processes will be facilitated using a wide variety of accessible multi-media approaches, including short video clips, animations, and graphics, as well as interactive online tools. Audio and visual resources will be closed-captioned for accessibility.

Method

Lecture

Integration

Traditional lectures will be presented along with audio-visual presentations, and demonstrations of current concepts in science.

DE Adaptations for MOI

Lectures will be delivered in an online environment using the Course Management System. Lectures may be PowerPoint presentations, written narratives, or accessible video lectures posted for the students to access. Audio and visual resources will be closed-captioned for accessibility.

Additional Methods of Instruction for Honors

Students will meet with their instructor regularly throughout the semester (minimum of 3 times, possibly more) to evaluate progress on the honors project and to discuss relevant issues further. Students will receive guidance on applying scientific approaches to gathering, manipulating and interpreting data or in addressing the chosen topic.

Students will be provided additional readings and resources relevant to their research topic and will be expected to consider their significance and integrate the content into their overall understanding of the issue they are investigating.

Methods of Evaluation**Method**

Papers

Integration

Case studies will be analyzed to apply science concepts presented in the course and to predict outcomes and treatments appropriate for each scenario. Students will be asked to critically assess the ways in which different groups of people have been impacted by the advances of science and to evaluate these impacts within a framework of social justice. Evaluation will be based on clarity, organization, and thoroughness of content with appropriate application of course material. Feedback will be provided in a timely manner in order to keep pace with the course and allow students ample time to improve their work.

DE Adaptations for MOE

Case studies will be presented by means of accessible materials made available through the CMS. Students may rely on internet sources and library databases for additional background. Papers will be submitted via the Assignment portal in the CMS and timely feedback will be provided in written or verbal form in the same forum.

Method

Homework

Integration

Periodic assessments and practice problems will provide opportunities for students to work toward content mastery. These formative assessments may be multiple-choice, written, or oral. Timely feedback will be provided before students encounter summative assessments on the same content.

DE Adaptations for MOE

Formative assessments will be administered and timely feedback provided through the CMS.

Method

Exams/Tests

Integration

Comprehensive examinations will be used to gauge students' synthesis of the interactions of humans with their biotic and abiotic environment as presented by materials assigned and discussed in lecture and through individual study. The summative exam will be based on materials students have engaged with in formative assessments. Exams may consist of a variety of assessment types ranging from multiple-choice questions to essays. Feedback will be provided by the instructor in a timely manner.

DE Adaptations for MOE

Exams will be facilitated online in the course management system (CMS) and may consist of multiple choice questions, which may be auto-graded, or essay responses, which will be uploaded through the Quiz function. Timely feedback will be provided by the instructor.

Method

Class Participation

Integration

Facilitated discussions will involve students in critical thinking interactions and activities concerning current issues and topics in science. Evaluation will be based on the level of participation, reasoning process, and appropriate application of course concepts.

DE Adaptations for MOE

Participation in class discussions will take place in the Discussion Forum feature of the CMS. Students will be required to actively engage with peers and with the instructor in these forums. A clear rubric will be provided outlining the requirements for the amount and timeliness of participation. Other discussion modalities, including accessible video conferencing software, may be utilized as well. Timely feedback will be provided in the CMS.

Method

Research Projects

Integration

Research papers will require an assessment of current peer-reviewed scientific research on topics related to the study of human interactions with their biotic and abiotic environment. Evaluation will be based on clarity, organization, and thoroughness of content.

DE Adaptations for MOE

Research papers may rely on resources available through the MSJC online databases as well as other materials accessed online. Papers will be submitted via the CMS Assignment portal and timely feedback will be provided for students in the same forum.

Evaluation of Honors assignments

To receive honors credit, students must successfully complete regular course and honors supplemental assignments.

The honors project will be assessed according to the organization and presentation of the research project, the number and kind of references consulted, the depth of the analysis of theoretical framework for the work investigated, and the thoughtful exposure of different points of view on the topic investigated. The presentation or report will be assessed for clarity, organization, critical thinking, and a summary of anticipated results. Honors students are expected to question prevailing thinking and formulate original answers after completing professional research, and then present those ideas in written and/or oral form.

Assignments**Assignment Type**

Reading

In-class and/or outside of class

In-class

Outside of class

**Formative or Summative**

Formative

Assignment

Analyze two passages that describe the physical and natural environment of the Inland Valley as it has changed over the past several thousand years. Speculate on how and why the geological, biological and ecological aspects of the region have been in flux. Consider the implications of these changes for various cultural groups in the region and weigh their relative contributions to the diverse social fabric of the region.

How assignment will be adapted in online format

Students will analyze the suggested passages as presented in the CMS. They will have the opportunity to share and discuss ideas in the discussion forum as well as submit a short writing assignment through the CMS. A clear rubric will be provided to guide students and thorough timely feedback will be provided through the CMS.

Assignment Type

Writing

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Summative

Assignment

In a 1-2 page paper, describe the events that led up to the Agricultural (Green) Revolution and assess the ensuing impacts on biological diversity and human cultural heritage.

How assignment will be adapted in online format

Students will base their writing on materials presented in various accessible formats in the CMS. Completed papers will be submitted through the Assignments feature, where students will also be able to access a rubric. Thorough and timely feedback will also be given through the CMS.

Honors Assignments**Assignment**

Students will complete all regular course requirements for ENVS 100 and be graded according to the standards used for the rest of the class. In addition, students will be expected to complete one of option A or B, as well as Option C.

Required or Optional

Required

Assignment

Option A: Choose a specific topic covered in this course and produce a comparison of how it has impacted two or more different cultural, ethnic, socioeconomic, or gender groups. For example, physics and engineering have led to safety systems in cars that have variable effectiveness between genders. The environmental and conservation movements have had greater impacts on the well-being of people of dominant affluent cultures. Alternatively, the topic could focus on two different geographical regions of the world (such as a comparison of biodiversity between islands and continents, or between the temperate and tropical zones).

Research papers should be 5-8 pages in length and be based on a minimum of five peer-reviewed references.

The same assignment will be used in the distance education modality. Guidance from the instructor will be facilitated using accessible video conferencing software or asynchronous email communication. Research materials will be accessed using the online

databases maintained by the MSJC library. The final project will be submitted using the Assignment feature of the CMS, where timely feedback will also be provided.

Required or Optional

Optional

Honors Core Values

Academic Rigor and Research

Justify how the assignment reflects the Academic Rigor and Research Core Value

Students will develop a research project based on their strong foundation in the core principles presented in the class. They will draw on an array of academic sources to synthesize an analysis of the varied impacts science has on humanity.

Assignment

Option B: Engage in a service-learning project. The student, with the approval of the instructor, will identify a local organization that engages in some way with the scientific endeavor where the student can volunteer to assist in some manner. Examples might include a local astronomy club, a botanical garden, a biotech lab, or an environmental advocacy group.

The student will be expected to volunteer a minimum of 20 hours with this organization over the course of the semester. This experience will be integrated into a research paper that explores the industry and career prospects relative to the organization. Papers should be 4-5 pages in length and include 2-3 references.

The same assignment will be used in the distance education modality. The instructor will provide guidance using accessible communication tools such as email or video conferencing software. Supplemental research materials will be accessed using the online databases maintained by the MSJC library. The final project will be submitted using the Assignment feature of the CMS, where timely feedback will also be provided.

Required or Optional

Optional

Honors Core Values

Engagement

Positive Transgressive Behavior (as evidenced by creativity, innovation, risk taking, challenging norms and standard narratives)

Justify how the assignment reflects the Engagement Core Value

The volunteer component engages students directly in their community and immerses them in their field of interest. Persistence and commitment to the project are requisite to meet the required number of hours.

Justify how the assignment reflects the Positive Transgressive Behavior Core Value

Students will move beyond the campus environment to engage in a volunteer experience. This requires initiative and commitment. It additionally challenges the norms of learning activities and will empower students to see themselves as a part of a professional community in which they can play an active role and make a positive contribution.

Assignment

Option C: Students will keep a journal documenting their progress through Option A or B. Students will document the refinement of the topic, issue, or question they wish to pursue. They will keep track of relevant citations and data sources, including annotations for quick reference. Any service hours or data collection activities will be included along with notes from meetings with the instructor. The journal can be kept digitally or on paper and should be kept up to date and available for consultation with the instructor so that streamlined and personal guidance can be provided for the development of the research or service learning project.

The same assignment will be used in the distance education modality. Guidance from the instructor will be facilitated using accessible video conferencing software or asynchronous email communication. The final project will be submitted using the Assignment feature of the CMS, where timely feedback will also be provided.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement

Justify how the assignment reflects the Academic Rigor and Research Core Value

Rigorous note-taking and documentation are important to conducting research. This project will support students in the development of a successful Honors project and will underscore the importance of attention to detail in academic endeavors.

Justify how the assignment reflects the Engagement Core Value

Students will be engaged throughout the course of the semester in the ongoing development of the research/service learning project. The journal will provide a record of progress and instill a sense of accountability, ultimately leading to refined product.

Course Materials

Textbooks

Trefil, James and Robert M Hazen (2016). The Sciences, An Integrated Approach Wiley. ISBN: 9781119234333

Hewitt, P.G., S.A. Lyons, J.A. Suchocki, J. Yeh (2020). Conceptual Integrated Science, 3rd Ed. Pearson. ISBN: 978-0135197394

Tillery, B, E. Eldon, and F. Ross (2022). Integrated Science, 8th Ed. McGraw-Hill. ISBN: 9781260721485

Class Size Information

Class Size

40

Class Size Category

A - Lecture/discussion 40

Diversity and Inclusion

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

This course provides a broad framework in general scientific literacy with an emphasis on issues that impact the human condition. As such, considerations of social justice are integrated into the content and students are invited to explore the ways in which the benefits of scientific discoveries have historically been unevenly shared across cultures and genders. Furthermore, students are exposed to diverse figures in the world of science, while exploring unequal representation in contemporary science against the backdrop of the history of marginalization and erasure of the contributions made by scientists representing non-dominant groups.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

The course content highlights diverse figures in science that challenge commonly held stereotypes. Subject matter centers on global issues and students are exposed to diverse cultures, voices, and lived experiences. Assignments invite students to explore environmental justice issues that affect marginalized communities both domestically and abroad. Instruction is focused on eliminating structural barriers to success by incorporating open educational resources and presenting a diverse array of media to connect with a spectrum of learning styles. In addition, students are expected to interact with one another in discussions centered on global events and to share their perspectives and personal experiences while adhering to norms of inclusivity.

Interactions

Explain how the course will incorporate student-to-student interaction.

Students will have frequent opportunities to interact with one another in online (facilitated in the discussion forum of the CMS) or in-person discussions focusing on scientific principles as they apply to the students' local environments, real-world concerns, and lived experiences. These interactions will augment the other forms of content delivery employed in this course by exposing students to diverse perspectives held by members of their own communities with respect to scientific achievements and their impacts on different cultural groups (see MOI #1). Students will be encouraged to develop and abide by norms of tolerance and inclusivity.

Explain how the course will incorporate instructor-to-student interaction.

Instructors will participate in and guide group discussions focusing on the disproportionate impacts of various scientific advances on different cultures, ethnic communities, genders, and socioeconomic groups and the environments they inhabit. For challenging assignments and projects, instructors will model metacognitive approaches, engaging with students to guide them through complex critical thinking processes. Feedback will be provided either verbally, in writing, or in the course management system. Instructors will be available to answer questions and interact with students directly.

Explain how the course will incorporate student-to-content interaction.

Students will be provided with a variety of accessible forms of media for making sense of the complex impacts of scientific discoveries and advances on the environment and on various groups of people around the world. These may include written narratives, journal articles, textbook materials, videos, or verbal lectures. A diverse array of approaches will be employed to accommodate various learning styles. Students will work towards concept mastery through formative assessments, engage in deeper, more reflective work through critical writing assignments, and will assess their assimilation of the content through summative assignments.

Explain how the course will incorporate student-to-self interaction (metacognitive).

Students will engage in critical thinking activities that require the application of scientific concepts and frames of reference to issues that directly affect their lives. They will be encouraged to consider their own place in the world of science and have opportunities to critically assess their stance on contemporary environmental concerns. Students will be encouraged to express themselves freely as they assimilate foundational scientific paradigms and attempt to integrate them with their preconceived notions. Through this process, students will engage with issues through the lens of science and be given the opportunity to reflect on any discordance between their subjective worldview and their understanding of objective science.

Key: 1524