Please attach/submit additional documents as needed to fully complete each section of the form.

COURSE INFORMATION

Department: geosciences
Course Title: Science and Society
Course Number: GEO304E

Type of Request: New One-time Only Renew* Change Remove

Rationale:

*If course has not changed since the last review and is taught by the same tenure-track faculty member, you may skip sections III-V.

JUSTIFICATION FOR COURSE LEVEL
Normally, general education courses will not carry pre-requisites, will carry at least 3 credits, and will be numbered at the 100-200 level. If the course has more than one pre-requisite, carries fewer than three credits, or is upper division (numbered at the 300 level or above), provide rationale for exception(s).

II. ENDORSEMENT / APPROVALS

* Instructor:
  Phone / Email: 5774 bendick@msu.umt.edu
  Signature __________________________ Date 11/20/16

Program Chair:
  Signature __________________________ Date 11/20/16

Dean:
  Signature __________________________ Date 11/29/16

*Form must be completed by the instructor who will be teaching the course. If the instructor of the course changes before the next review, the new instructor must be provided with a copy of the form prior to teaching the course.

III. DESCRIPTION AND PURPOSE

General Education courses must be introductory and foundational within the offering department or within the General Education Group. They must emphasize breadth, context, and connectedness; and relate course content to students’ future lives: See Preamble

Please see previous review materials (attached).
IV. CRITERIA

BRIEFLY EXPLAIN HOW THIS COURSE MEETS THE CRITERIA FOR THE GROUP.

1. Courses focus on one or more of the specific traditions of ethical thought (either Western or non-Western), on basic ethical topics such as justice or the good life as seen through the lens of one or more traditions of ethical thought, or on a professional practice within a particular tradition of ethical thought.

   Please see previous review materials (attached).

2. Courses provide a rigorous analysis of the basic concepts and forms of reasoning which define the traditions, the ethical topics, or the professional practices that are being studied.

   Please see previous review materials (attached).

V. STUDENT LEARNING GOALS

BRIEFLY EXPLAIN HOW THIS COURSE WILL MEET THE APPLICABLE LEARNING GOALS.

1. Correctly apply the basic concepts and forms of reasoning from the tradition or professional practice they studied to ethical issues that arise within those traditions or practices.

   Please see previous review materials (attached).

2. Analyze and critically evaluate the basic concepts and forms of reasoning from the tradition or professional practice they studied

   Please see previous review materials (attached).
VI. ASSESSMENT

A. HOW ARE THE LEARNING GOALS ABOVE MEASURED? Describe the measurement(s) used, such as a rubric or specific test questions that directly measure the General Education learning goals. Please attach or provide a web link to the rubric, test questions, or other measurements used.

1. The midterm for this course involves a short paper presenting a historical analysis of an ethical question with a scientific component. Examples from past midterms include the following prompts:
   a. What are scholarly ethics? Are they fundamental to human study, or do they change in different social, economic, and cultural settings? Support your position using both historical and modern examples. (2015)
   b. What do you think is the most important scientific contribution in history? Why? How did this discovery create new social and ethical challenges? (2014)
   c. What is the difference between theoretical and empirical knowledge? What are the critical considerations in developing them? Give examples from historical arguments to support your argument. (2013)

2. The final project for this course involves implementing an activity that combines scientific discoveries and their impact on human communities, especially how they influence ethical choices. Examples of past successful projects include running panel discussions on human genetic engineering and medicine, producing outreach materials about meat production practices, producing a website that helps students reduce their climate impact, and volunteering for 20+ different local and regional nonprofit organizations chosen by individual students based on their analysis of a current issue.

3. The final assessment criterion for this course involves participation in class discussions. The students are evaluated at each course meeting based on three components: interaction with the discussion, integration of reading materials (including original historical source materials and textbook materials), and ability to formulate a cogent and philosophically consistent argument. These skills are developed during the course progression by explicit discussion of methods for ethical reasoning and discussion of the historical development of ethical traditions, especially Kantian ethics, utilitarianism, and contemporary virtue ethics.

A General Education Assessment Report will be due on a four-year rotating cycle. You will be notified in advance of the due date. This will serve to fulfill the University’s accreditation requirements to assess general education and will provide an opportunity to connect with your colleagues across campus and share teaching strategies. Items VI.B- D will be helpful in compiling the report.

B. ACHIEVEMENT TARGETS

[This section is optional. Achievement targets can be reported if they have been established.]

Describe the desirable level of performance for your students, and the percentage of students you expected to achieve this:

1. Students can read and understand historical and modern primary source material, and extrapolate a personal position (85%).
2. Students can apply ethical and moral standards to novel situations, especially those arising from modern scientific advances (90%).

3. Students can articulate a clear opinion, listen and understand others' opinions, and participate in structured discourse on a complex and potentially challenging topic (100%).

C. ASSESSMENT FINDINGS

[This section is optional. Assessment findings can be reported if they are available.]

What were the results/findings, and what is your interpretation/analysis of the data? (Please be detailed, using specific numbers/percentages when possible. Qualitative discussion of themes provided in student feedback can also be reported. Do NOT use course grades or overall scores on a test/essay. The most useful data indicates where students' performance was stronger and where it was weaker. Feel free to attach charts/tables if desired.)
Given your students’ performance the last time the course was offered, how will you modify the course to enhance learning? You can also address how the course could be improved, and what changes in the course content or pedagogy you plan to make, based upon on the findings. Please include a timeframe for the changes.

This course regularly scores very highly in course evaluations, and the students commonly perform strongly against the assessment criteria. I am always striving to be more clear in my expectations, this year implementing some aspects of contract grading, which worked well.

VII. SYLLABUS AND SUBMISSION

Please submit syllabus in a separate file with the completed and signed form to the Faculty Senate Office, UH 221. The learning goals for the Ethics Group must be included on the syllabus. An electronic copy of the original signed form is acceptable.
Science and Society

Course requirements: This course will be graded based on, in equal proportion, the midterm score, participation in class discussions including one class that you will moderate in the second half of the term, and a final project consisting of participation in some local or national issue related to science. Examples of possible projects include: a letter to the newspaper, to your Congressional delegation, or to local government representatives; volunteer time with a local advocacy group; a presentation in a local school or to a local group; an organized outreach effort; or another participatory activity (approved by the instructor).

Learning goals: The goals of this course include developing proficiency in the following skills: applying concepts and forms of reasoning to ethical issues, analyzing and evaluating forms of reasoning, identifying and using traditions of ethical thought, and evaluating ethical discourse.

Course structure: The structure of the class is based on Socratic discussion. In the first half of the term, we will alternate between readings from the textbook, which give historical context, and important primary sources. You will be expected to discuss the readings in class in detail, so you should be familiar with the material before our meetings. In the second half of the term, we will use philosophical tools and historical context to discuss urgent modern issues. One class meeting on each topic will be moderated by the instructor and the other by a group of students. Readings or activities in student-run meetings will be chosen by the students.


Instructor: Rebecca Bendick, SC 331
Bendick@mso.umt.edu
406-243-5774
office hours: MF 10:00-12:00 or by appointment

Part 1: history and philosophy of science

Week 1: the ancients
1 September: Intro, logistics, expectations
3 September: E&C Chapter 1 + Lucretius “On the nature of things”

Week 2: the early Christian era and Islamic scholarship
8 September: E&C 2
10 September: Avicenna “Canon”

Week 3: the revival of western science and philosophy
15 September: E&C 3
17 September: Thomas Aquinas “Questions I-IV”
Roger Bacon handout

Week 4: Renaissance, exploration, and scientific revolution
22 September: E&C 4
24 September: Galileo “Two New Sciences” and “Letter to the Grand
Duchess Christina”

Week 5: Scientific revolution and modern methods
29 September: E&C 5
1 October: Newton “Principia Mathematica”
Descartes “Discourse on the Method…”

Week 6 & 7: Enlightenment: the commercial value of science and natural history
6 October: no class
8 October: E&C 6
13 October: Declaration of Independence

Week 8: Transition
15 October: E&C Conclusion, MIDTERM

Part 2: modern issues of science and society

Weeks 9-14: modern topics to be decided. Some suggestions include:
Evolution and intelligent design
Death and birth
Climate change
Neurology, guilt, and criminality
Free will
Global Energy
Food security
Human perception and reality
Extraterrestrial life
Natural catastrophes and economics of risk
Quantum physics and certainty

Week 15: Summary and conclusions
8-10 December: FINAL PRESENTATIONS/PROJECTS

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.
All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321.
I. ASCRC General Education Form (revised 1/27/11)

Use to propose new general education courses (except writing courses), to change existing gen ed courses and to remove designations for existing gen ed courses.

Note: One-time-only general education designation may be requested for experimental courses (X91-previous Y95), granted only for the semester taught. A NEW request must be submitted for the course to receive subsequent general education status.

<table>
<thead>
<tr>
<th>Group (submit separate forms if requesting more than one general education group designation)</th>
<th>III. Language</th>
<th>VII. Social Sciences</th>
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<tbody>
<tr>
<td></td>
<td>III Exception: Symbolic Systems *</td>
<td>VIII. Ethics &amp; Human Values</td>
</tr>
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<td></td>
<td>IV: Expressive Arts</td>
<td>IX: American &amp; European</td>
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<td>V: Literary &amp; Artistic Studies</td>
<td>X: Indigenous &amp; Global</td>
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<td></td>
<td>VI: Historical &amp; Cultural Studies</td>
<td>XI: Natural Sciences w/ lab □ w/out lab □</td>
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</tbody>
</table>

*Courses proposed for this designation must be standing requirements of majors that qualify for exceptions to the modern and classical language requirement.

<table>
<thead>
<tr>
<th>Dept/Program</th>
<th>GEO</th>
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<tbody>
<tr>
<td>Course Title</td>
<td>Science and Society</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>none</td>
</tr>
<tr>
<td>Credits</td>
<td></td>
</tr>
</tbody>
</table>

| Course # | 304 |

II. Endorsement/Approvals

Complete the form and obtain signatures before submitting to Faculty Senate Office

Please type/print name  Signature  Date

Instructor | Rebecca Bendick
Phone/Email | 5774 bendick@mos.umt.edu
Program Chair | Johnnie Moore
Dean | Christopher Comer

III. Type of request

<table>
<thead>
<tr>
<th>New</th>
<th>One-time Only</th>
<th>Renew</th>
<th>X</th>
<th>Change</th>
<th>Remove</th>
</tr>
</thead>
</table>

Reason for Gen Ed inclusion, change or deletion

Description of change

IV. Description and purpose of new general education course: General Education courses must be introductory and foundational within the offering department or within the General Education Group. They must emphasize breadth, context, and connectedness; and relate course content to students’ future lives. See Preamble:

http://umt.edu/facultysenate/archives/minutes/gened/GE_preamble.aspx
First, the course offers a survey of western ethical traditions in its first half. This survey encompasses the three standard traditions described in your addendum: deontological, utilitarian, and virtue ethics. The students read selected excerpts from all of the texts cited as examples of these traditions, including *Nicomachean Ethics*, Mill’s *Utilitarianism*, and Kant’s *Foundations*. We also read and discuss material from the course textbook, Ede and McCormack’s *Science and Society*, which provides historical and philosophical context to these readings. The intention of these readings is to provide the students with a foundational (albeit very basic) understanding of all of the western ethical traditions sufficient for them to select and apply appropriate ethical standards to scientific issues during the second part of the course. Thus, the course design is intended not only to introduce fundamental ethical traditions, but to encourage students to apply them beyond their original formulations. The course also introduces students to the basics of western epistemology.

Second, very much in concert with the above, the students are encouraged through discourse to explore the basic concepts of all three traditions as a means of learning to apply them. It seems to me self-evident that the intellectual transition from reading a basic excerpt on an ethical tradition to applying that tradition in a novel context requires an understanding of the underlying concepts. The course material facilitates this transition in two ways. In the first, survey, part of the course, we directly discuss the concepts of each tradition when we undertake the primary reading. For example, when discussing Mill, we consider the meaning of costs and benefits, how they might differ for different stakeholders, what might constitute absolute costs or benefits, and how comparative values might be assessed for non-economic qualities. In the second, application, part of the course, when addressing a particular issue of interest, we first decide which ethical tradition might be appropriate for its evaluation. For example, in the case of human genetic engineering, we first discuss whether utilitarianism or deontological ethics are more appropriate to particular cases, including how this first choice constrains the range of further considerations. The students then develop their understanding of ethics by directly applying the selected ethical standards to specific case studies, thus demonstrating their evolving understanding of those standards.

Finally, in the second half of the class, the students explore modes of moral reasoning through direct applications to modern issues. Our selection of topics varies annually, depending on the interests of the students, scientific or social developments, and newsworthiness. Topics addressed in past semesters include: evolution and intelligent design, human genetic engineering, agricultural biotechnology, climate change, global energy issues, global food issues, resource sustainability, nanotechnology, death and end-of-life, birth and conception, free will and modern neurobiology, and extraterrestrial life. The pattern of instruction is systematic in all cases. First, the general scientific background is introduced. We next discuss the social, cultural, and ethical implications of the science. Then, the students use their understanding of western ethical traditions to qualitatively assess the issue, including whether and which constraints should be placed on scientific practices, how such constraints might be applied given cultural, social and economic contexts, and how they as individuals might exercise their own moral standards. This discussion and discourse is ultimately designed to reinforce the students’ understanding of basic ethical methods, as well as to develop their critical thinking and moral reasoning skills and to encourage them to participate as informed reasoners in their own society. The topics discussed are all of immediate concern, and require the attention of citizens with a combination of scientific and ethical literacy.

Given the design and the intention of this course, I strongly believe that it should retain the E designation. That designation brings most of the students to the course initially. The enrollment usually includes students from all four classes (freshmen to senior) and from as many as 10-12 different majors. This diversity of expertise and perspective is critical to the
**V. Criteria:** Briefly explain how this course meets the criteria for the group. See: [http://umontreal.ca/facultysenate/documents/forms/GE_Criteria5-1-08.aspx](http://umontreal.ca/facultysenate/documents/forms/GE_Criteria5-1-08.aspx)

| Focus on specific traditions of ethical thought | The course provides a historical exploration of Western scientific and ethical philosophy, including virtue ethics, deontological ethics, and utilitarianism. The concepts are introduced through discussion of their historical development and through simple excerpt readings from primary sources. |
| Focus on basic ethical topics | The specific western ethical traditions are then applied to case studies from modern science, with topics varying yearly in response to ongoing developments. |
| Analyze forms of reasoning | In order to apply traditional ethical and epistemological concepts to modern scientific issues, the students must practice elementary critical thinking and reasoning skills, as well as develop skills in analysis and exposition. |

**VI. Student Learning Goals:** Briefly explain how this course will meet the applicable learning goals. See: [http://umontreal.ca/facultysenate/documents/forms/GE_Criteria5-1-08.aspx](http://umontreal.ca/facultysenate/documents/forms/GE_Criteria5-1-08.aspx)

| Apply concepts and forms of reasoning to ethical issues | The students directly apply ethical traditions to modern topics, thus demonstrating their ability to comprehend those ethical concepts and to apply them in new contexts. |
| Analyze and evaluate forms of reasoning | Application of ethical and epistemological concepts to novel scientific fields fundamentally requires students to evaluate forms of reasoning. |

**VII. Justification:** Normally, general education courses will not carry pre-requisites, will carry at least 3 credits, and will be numbered at the 100-200 level. If the course has more than one pre-requisite, carries fewer than three credits, or is upper division (numbered above the 200 level), provide rationale for exception(s).

This course is more narrowly focused on science's role in ethical debates than might be expected for a lower-division offering. It requires that students have some pre-existing skills in reading primary materials, analyzing them critically, and evaluating them, as well as some familiarity with scientific methods. It therefore is best offered at the 300 level.

However, the course, as described throughout this document, is designed to bolster and develop ethical and critical thinking in the context of scientific issues from this limited foundation. It does not have any prerequisites, and is open to students from any and all disciplines. Therefore, it satisfies the accessibility requirements inherent in the GenEd structure.
Science and Society

Course requirements: This course will be graded based on, in equal proportion, the midterm score, participation in class discussions including one class that you will moderate in the second half of the term, and a final project consisting of participation in some local or national issue related to science. Examples of possible projects include: a letter to the newspaper, to your Congressional delegation, or to local government representatives; volunteer time with a local advocacy group; a presentation in a local school or to a local group; an organized outreach effort; or another participatory activity (approved by the instructor).

Course structure: The structure of the class is based on Socratic discussion. In the first half of the term, we will alternate between readings from the textbook, which give historical context, and important primary sources. You will be expected to discuss the readings in class in detail, so you should be familiar with the material before our meetings. In the second half of the term, we will use philosophical tools and historical context to discuss urgent modern issues. One class meeting on each topic will be moderated by the instructor and the other by a group of students. Readings or activities in student-run meetings will be chosen by the students.


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office hours: MW 12:00-2:00

Part 1: history and philosophy of science
Week 1: the ancients
30 August: Intro, logistics, expectations
1 September: E&C Chapter 1 + Lucretius “On the nature of things”
    + Niomachean Ethics

Week 2: the early Christian era and Islamic scholarship
6 September: E&C 2
8 September: Avicenna “Canon”

Week 3: the revival of western science and philosophy
13 September: E&C 3
15 September: Thomas Aquinas “Questions I-IV”
    Roger Bacon handout
Week 4: Renaissance, exploration, and scientific revolution
   20 September: E&C 4
   22 September: Galileo “Two New Sciences” and “Letter to the Empress Christina” plus handout

Week 5: Scientific revolution and modern methods
   27 September: E&C 5
   29 September: Newton “Principia Mathematica”
         Descartes “Discourse on the Method…”

Week 6: Enlightenment: the commercial value of science and natural history
   4 October: E&C 6
   6 October: Declaration of Independence + Mill “Utilitarianism”

Week 7: Science and Ethics
   11 October: E&C Conclusion + Kant “Foundations”
   14 October: Intro to modern topics; choices of modern topics

Part 2: modern issues of science and society
Week 8: Introduction to modern topics: evolution
   18 October: MIDTERM
   20 October: TBA

Weeks 9-14: modern topics to be decided. Some suggestions include:
   Evolution and intelligent design
   Death and birth
   Climate change
   Neurology, guilt, and criminality
   Free will
   Global Energy
   Food security
   Human perception and reality
   Extraterrestrial life
   Natural catastrophes and economics of risk
   Quantum physics and certainty

Week 15: Summary and conclusions
   9 December: FINAL PROJECTS

Please note: Approved general education changes will take effect next fall.

General education instructors will be expected to provide sample assessment items and corresponding responses to the Assessment Advisory Committee.