**Course Approval Form**

**Action Requested:**
- [X] Create new course
- [ ] Inactivate existing course
- [ ] Reinstate inactive course
- Modify existing course (check all that apply)

**Course Level:**
- [X] Graduate
- [ ] Undergraduate

**College/School:**
- COS

**Department:**
- AOES

**Submitted by:**
- Dr. Stacey Verardo
- Ext: 1045
- Email: sverardo@gmu.edu

**Subject Code:**
- GEOL

**Number:**
- 532

**Effective Term:**
- [X] Fall
- Spring
- Year
- 2015
- [ ] Summer

**Title:**
- Paleoclimatology

**Credits:**
- [X] 3
- [ ] Fixed
- [ ] Variable

**Repeat Status:**
- [X] Not Repeatable (NR)
- [ ] Repeatable within degree (RD)
- [ ] Repeatable within term (RT)

**Grade Mode:**
- [X] Regular (A, B, C, etc.)
- [ ] Satisfactory/No Credit
- [ ] Special (A, B, C, etc. +IP)

**Schedule Type:**
- [X] Lecture (LEC)
- Lab (LAB)
- Recitation (RCT)
- Internship (INT)

**Prerequisite(s):**
- Previous lab-science courses in geology and/or atmospheric science and/or oceanography (12 credit hours); or permission of instructor.

**Corequisite(s):**

**Restrictions Enforced by System:** Major, College, Degree, Program, etc. Include Code.

**Fulfills Mason Core Req?** (undergrad only)
- [ ] Currently fulfills requirement
- [X] Submission in progress

**Catalog Copy for NEW Courses Only** (Consult University Catalog for models)

<table>
<thead>
<tr>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explores the natural evolution of Earth’s climate with the goal of providing a baseline for understanding present climate variability and future trends through increased knowledge of the physical, chemical, and biological processes that influence climate over the long-term.</td>
<td>(List additional information for the course)</td>
</tr>
</tbody>
</table>

**Indicate number of contact hours:**

| Hours of Lecture or Seminar per week: | 3 |

| Hours of Lab or Studio: |

**When Offered:**
- [X] Fall
- [ ] Summer
- [ ] Spring

**Approval Signatures**

**For Graduate Courses Only**

| Graduate Council Member | Provost Office | Graduate Council Approval Date |

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**For Registrar Office’s Use Only:** Banner______________________Catalog______________________ revised 10/16/14
1. **COURSE NUMBER AND TITLE**: GEOL 532

**Course Prerequisites**: Previous lab-science courses in geology and/or atmospheric science and/or oceanography (12 credit hours); or permission of instructor.

**Catalog Description**: Explores the natural evolution of Earth’s climate with the goal of providing a baseline for understanding present climate variability and future trends through increased knowledge of the physical, chemical, and biological processes that influence climate over the long-term.

2. **COURSE JUSTIFICATION**:

**Course Objectives**: This course will provide one of the core courses (Atmosphere) for the MS in ESS degree.

**Course Necessity**: AOES currently does not provide any Atmosphere core courses for MS in ESS degree.

**Course Relationship to Existing Programs**: Course is designed to fulfill core Atmosphere requirement in support of the Earth Systems Science MS.

**Course Relationship to Existing Courses**: Course content is not covered in other graduate courses so it does not conflict with existing courses.

3. **APPROVAL HISTORY**: Approved by AOES faculty on 21 Nov 2014.

4. **SCHEDULING AND PROPOSED INSTRUCTORS**:

**Semester of Initial Offering**: Fall ‘15

**Proposed Instructors**: Dr. Stacey Verardo

5. **TENTATIVE SYLLABUS**: See below.
PALEOCLIMATOLOGY
GEOL 532
Fall 20XX

Instructor: Dr. Stacey Verardo
sverardo@gmu.edu, 703-993-1045

Class hours: Tuesdays and Thursdays, 9:00–10:15am
Classroom: Exploratory Hall 1309

Office: Exploratory Hall 3451
Office Hour: Thursdays, 11am -noon

Goals and Objectives: This course will explore the natural evolution of Earth's climate with the goal of providing a baseline for understanding present climate variability and future trends through increased knowledge of the physical, chemical, and biological processes that influence climate over the long-term.

Text: Earth’s Climate, Past and Future, Ruddiman, 2011 3rd ed
Videos: http://www.nbclearn.com/portal/site/learn/changing-planet

LECTURES

<table>
<thead>
<tr>
<th>Dates</th>
<th>Lecture Topic</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 27</td>
<td>Overview of Climate Science</td>
<td>1</td>
</tr>
<tr>
<td>August 28</td>
<td>Earth’s Climate System Today</td>
<td>2</td>
</tr>
<tr>
<td>September 2</td>
<td>Earth’s Climate System Today</td>
<td></td>
</tr>
<tr>
<td>September 4</td>
<td>Climate Archives</td>
<td>3</td>
</tr>
<tr>
<td>September 9</td>
<td>ANDRILL video</td>
<td></td>
</tr>
<tr>
<td>September 11</td>
<td>CO₂ and Long Term Climate</td>
<td>4</td>
</tr>
<tr>
<td>September 16</td>
<td>Plate Tectonics and Climate</td>
<td>5</td>
</tr>
<tr>
<td>September 18</td>
<td>Greenhouse Earth</td>
<td>6</td>
</tr>
<tr>
<td>September 23</td>
<td>Icehouse Earth</td>
<td>7</td>
</tr>
<tr>
<td>September 25</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>September 30</td>
<td>EXAM 1</td>
<td></td>
</tr>
<tr>
<td>October 2</td>
<td>Astronomical Control of Solar Radiation</td>
<td>8</td>
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<tr>
<td>October 7</td>
<td>Insolation Control Of Monsoons</td>
<td>9</td>
</tr>
<tr>
<td>October 9</td>
<td>Insolation Control of Ice Sheets</td>
<td>10</td>
</tr>
<tr>
<td>October 14</td>
<td>COLUMBUS BREAK (Monday schedule)</td>
<td></td>
</tr>
<tr>
<td>October 16</td>
<td>Orbital Scale Changes in CO₂ and CH₄</td>
<td>11</td>
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<tr>
<td>October 21</td>
<td>Orbital Scale Interactions</td>
<td>12</td>
</tr>
<tr>
<td>October 23</td>
<td>Last Glacial Maxima</td>
<td>13</td>
</tr>
<tr>
<td>October 28</td>
<td>Climate During and the last Deglaciation</td>
<td>14</td>
</tr>
<tr>
<td>October 30</td>
<td>Millennial Oscillations in Climate</td>
<td>15</td>
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<tr>
<td>November 4</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>November 6</td>
<td>EXAM 2</td>
<td></td>
</tr>
<tr>
<td>November 11</td>
<td>Humans and Preindustrial Climate</td>
<td>16</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Notes</td>
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<tr>
<td>November 13</td>
<td>Climate Change over past 1000yrs</td>
<td>17</td>
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<tr>
<td>November 18</td>
<td>Climate since 1850</td>
<td>18</td>
</tr>
<tr>
<td>November 20</td>
<td>Causes of Warming over last 125yrs</td>
<td>19</td>
</tr>
<tr>
<td>November 25</td>
<td>Climate Change in the future</td>
<td>20</td>
</tr>
<tr>
<td>November 27</td>
<td>THANKSGIVING</td>
<td></td>
</tr>
<tr>
<td>December 2</td>
<td>Class Presentations</td>
<td></td>
</tr>
<tr>
<td>December 4</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>December 11</td>
<td><strong>FINAL EXAM 7:30-10:00am NOTE different time!!</strong></td>
<td></td>
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</tbody>
</table>

In addition, there will be readings from current material. Guest speakers will be part of the curriculum as well.

**COURSE INFORMATION**

This is a **three** credit course.

Presentation topic is due by September 11, 20XX

**Grading:** Three equally weighted exams.

**One 20 minute presentation relating to of one of the text chapters OR a related topic. The topic must be cleared by me. The presentations will utilize current and relevant research. This will a solo endeavor and will be evaluated by your classmates.**

**You will be responsible for a research paper. This can be the same topic as your presentation. Information will be forth coming.**

Make up exams will NOT be given.

All exams will emphasize material presented in the lectures. Students are responsible for all material in the textbook readings. Exams are closed book.

Attendance at all scheduled lecture classes is required to achieve the requisite level of knowledge in this course. This course operates under the rules of the Honor Code.