Trial Course OR NEW COURSE PROPOSAL

<table>
<thead>
<tr>
<th>Department</th>
<th>Atmospheric Sciences</th>
<th>College/School</th>
<th>CNSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by</td>
<td>Barbara Day</td>
<td>Phone</td>
<td>7368</td>
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</tbody>
</table>
| Email Contact       | bdday@alaska.edu     | Faculty Contact| Igor Polyakov,  
|                     |                      |                | igor@iarec.uaf.edu, 2686 |

1. **ACTION DESIRED**  (CHECK ONE):
   - Trial Course
   - New Course  **XX**

2. **COURSE IDENTIFICATION**:  
   - Dept: ATM  
   - Course #: F658  
   - No. of Credits: 3

   Justify upper/lower division status & number of credits:

   Course requires graduate level mathematics and programming skills. Course load, readings and homework are in keeping with three-credit hour student activities. In addition, this is a graduate level course directed at MS and PhD students enrolled in the atmospheric sciences program and students enrolled in other science programs; i.e., GEOS, Engineering.

3. **PROPOSED COURSE TITLE**:  
   - Air-Sea Interactions

4. **To be CROSS LISTED?**  
   - YES/NO: No  
   - If yes, Dept:  

   NOTE: Cross-listing requires approval of both departments and deans involved. Add lines at end of form for additional required signatures.

5. **To be STACKED?**  
   - YES/NO: No  
   - If yes, Dept:  

   How will the two course levels differ from each other? How will each be taught at the appropriate level?:

   Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e., is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed?; 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online — see URL at top of this page.

6. **FREQUENCY OF OFFERING**:  
   - Spring Even-Numbered Years

   Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. **SEMESTER & YEAR OF FIRST OFFERING**  
   (AY2013-14 if approved by 3/1/2013; otherwise AY2014-15)  
   - Spring 2018

8. **COURSE FORMAT**:

   NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the Core Review Committee.

   **COURSE FORMAT**:
   (check all that apply)

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</table>
   | 6 weeks to full semester

   **OTHER FORMAT**  (specify)

   Mode of delivery  (specify lecture, field trips, labs, etc)

   Lecture
9. CONTACT HOURS PER WEEK:

|            | 3 LECTURE hours/weeks | 0 LAB hours/week | 0 PRACTICUM hours/week |

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uaafac/faculty-senate/curriculum/course-degree-procedures/guidelines-for-computing/ for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

Example of a complete description:

FISH F487 W, O Fisheries Management
3 Credits Offered Spring
Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. Prerequisites: COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; ENGL F414; FISH F423; or permission of instructor. Cross-listed with NRM F487. (3+0)

ATM F658 Air-Sea Interactions
3 credits Offered Spring Even-Numbered Years
Course covers the basics processes governing air-sea interactions at different temporal and spatial scales including transfer of heat and momentum through air-sea surface, interactions of atmospheric and oceanic mixed layers, important examples of air-sea interactions; ie. El-Niño, and interactions between high-latitude atmosphere and ocean.

Prerequisites: ATM F601; Graduate Standing or Permission of Instructor (3+0).

11. COURSE CLASSIFICATIONS: Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

|            | S = Social Sciences | H = Humanities |

Will this course be used to fulfill a requirement for the baccalaureate core? If YES, attach form.

IF YES, check which core requirements it could be used to fulfill:

- O = Oral Intensive, Format 6
- W = Writing Intensive, Format 7
- X = Baccalaureate Core

11.A Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.

YES: [ ] NO: [ ]

12. COURSE REPEATABILITY:

Is this course repeatable for credit? YES [ ] NO X

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit? TIMES

If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course? CREDITS

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course? CREDITS

13. GRADING SYSTEM: Specify only one. Note: Changing the grading system for a course later on constitutes a Major Course Change - Format 2 form.

LETTER: X PASS/FAIL: [ ]
14. PREREQUISITES

ATM F601: graduate standing; or permission of instructor.

These will be required before the student is allowed to enroll in the course.

16. PROPOSED COURSE FEES

$0

Has a memo been submitted through your dean to the Provost for fee approval?

Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously?

Yes/No

If yes, give semester, year, course #, etc.:

Spring 2014; Spring 2016

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

none

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

X

Professor has talked to the librarian and all the required materials will be available at the Keith Mather Library.

20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

No impacts on other programs/departments.

21. POSITIVE AND NEGATIVE IMPACTS

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

No negative impacts. The positive impact is that the course will now be listed in the catalog.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campuswide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

In this day and age scientists need to have an understanding of the processes governing air-sea interactions at different temporal and spatial scales. This course will enable students at UAF to understand the basic mechanisms governing air-sea momentum and heat transfers; the interactions of upper ocean and lower atmosphere; follow the derivation and be able to provide a physical interpretation of terms in the equations for a mixed layer; concepts in interactions of upper ocean and lower atmosphere; in large-scale vertical atmospheric and oceanic interactions such as: hurricanes in atmosphere and deep convection in ocean; and to apply concepts from this class to their research.
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APPROVALS: Add additional signature lines as needed.

Signature, Chair, Program/Department of: Uma Bhatt, Atmospheric Sciences
Date 29 Aug 2016

Signature, Chair, College/School Curriculum Council for:
Date 8-29-16

Signature, Dean, College/School of: Date 8/30/16
Paul Lage CNSH

Offerings above the level of approved programs must be approved in advance by the Provost.
ATTACH COMPLETE SYLLABUS (as part of this application). This list is online at: http://www.ua.gov/faculty-senate/curriculum/course-degree-procedures-ua-syllabus-requirements/
The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES
During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. Course information:
   - Title, □ number, □ credits, □ prerequisites, □ location, □ meeting time (make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:
   - □ Name, □ office location, □ office hours, □ telephone, □ email address.

3. Course readings/materials:
   - □ Course textbook title, □ author, □ edition/publisher.
   - □ Supplementary readings (indicate whether □ required or □ recommended) and □ any supplies required.

4. Course description:
   - □ Content of the course and how it fits into the broader curriculum;
   - □ Expected proficiencies required to undertake the course, if applicable.
   - □ Inclusion of catalog description is strongly recommended, and □ Description in syllabus must be consistent with catalog course description.

5. □ Course Goals (general), and (see #6)

6. □ Student Learning Outcomes (more specific)

7. Instructional methods:
   - □ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

8. Course calendar:
   - □ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

9. Course policies:
   - □ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

10. Evaluation:
    - □ Specify how students will be evaluated, □ what factors will be included, □ their relative value, and □ how they will be tabulated into grades (on a curve, absolute scores, etc.) □ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but is a convenient way to publicize this.) Link to PDF summary of grading policy for "C": http://www.ua.gov/files/ua.gov/info-to-publicize-c_grading-policy-updated-may-2013.pdf

11. Support Services:
    - □ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

12. Disabilities Services: Note that the phone# and location have been updated. http://www.ua.gov/disability/
The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials.
    - □ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655) to provide reasonable accommodation to students with disabilities.

5/21/2013
ATM 658: Air-Sea Interactions

Spring 2016
Professor: Igor Polyakov
Office: IARC 408g
Tel: (474) 2686
email: igor@iarc.uaf.edu
Class room: 319 IARC Bldg
Class times: M & W: 12:00noon to 01:30pm
Office hours: 03:00 – 04:00pm M & W
3 credits

Prerequisites: Graduate standing or permission of the instructor. Basic mathematical and programming skills using FORTRAN or some other form are required.

Course Description:
This course covers the basics processes governing air-sea interactions at different temporal and spatial scales including transfer of heat and momentum through air-sea surface, interactions of atmospheric and oceanic mixed layers, important examples of air-sea interactions (like El-Niño), and interactions between high-latitude atmosphere and ocean. We will cover the topics from several books (see below), plus some additional topics. A detailed schedule of topics may be found in ‘Course Calendar’ and will likely evolve during the course of the semester.

We do have recommended textbooks. Readings from the text will be regularly assigned. Additional reading is recommended. The course will follow these readings. Of course in class we will emphasize certain topics. Material will be conveyed by standard lecture, in-class discussions, in-class presentations by students, and lab work.

Course Overall Goal:
Students will gain a fundamental knowledge of air-sea interactions and be prepared to take additional Atmospheric and Oceanic Dynamics/Thermodynamics courses.

Student Learning Outcomes:
Students who take this class, participate, do the homework, and attend regularly are expected to have the following skills:

- Understand basic mechanisms governing are-sea momentum and heat transfers.
- Understand basic concepts in interactions of upper ocean and lower atmosphere; follow the derivation and be able to provide a physical interpretation of terms in the equations for a mixed layer.
- Understand basic concepts in large-scale vertical atmospheric and oceanic interactions such as: hurricanes in atmosphere and deep convection in ocean.
- Apply concepts from this class to their research.
- Improve skills in presenting results. An important component to this business is presentation of your results, both in oral format as well as in journal format. We will work on issues of presentation via submitted work and class presentations.
**Instructional methods:** This course is based on lectures, which will cover the major topics, emphasizing and discussing the important points. They are not sessions to regurgitate material already written in the text. Your personal participation is important, and it is will help you learn more efficiently to read the assigned material before lecture.

**Materials Needed:**


**Other Tools:**
- Your favorite computational tools (like Fortran, IDL).
- Your favorite math books.

**Additional References:** To see the same topics explained differently, try the following:

**Basic Texts (Overviews)**

**Mathematics References**

**Course Policies:**

*Evaluation:* The course grade will consist of the following components. Final letter grades will be based on a standard scale: A=90 to 100%, B=80% to 89%, C=70% to 79%, D=50% to 69%, and F≤50%. As of Fall 2006, UAF has instituted a +/- scale to the grades, so the bottom and top 3 percentage points will fall within the '-' and '+' ranges, respectively. For example: 90-92% will be an A-, 93-96% will be an A, and above 97% will be an A+.

This course is based on a combination of lectures, labs and homework.

*Relative attendance* will be used for evaluation with two missed classes excused. The maximum score will be reduced proportional to the number of missed classes.

Evaluation of student *participation* in classes will be based on your answers to in-class questions regarding material covered in the previous class. The maximum score may be reduced if the student demonstrates lack of understanding of materials from the previous class (10% of the maximum score for each such case).

We will have a *class group project* during our final class when each student will present his/her results based on parts of your homework. The important task during these presentations will be for all students to work together and build a cohesive picture from
their homework projects.

*Homework:* There will be approximately one homework assignment each month. The problems will be handed out in class. You are highly encouraged to work with others on the homework, but please make sure that you understand the problems that you hand in. I will randomly ask students to present the homework on the board and the board presentation of the problems will be the major part of your homework grade. You will hand in your homework papers after the problems have been discussed in class on the due date. We will discuss some of the homework problems in class during Computer lab hours. The return of each completed homework will be required within a two-week period after each Computer lab.

*Exams:* During the final week, there will be in-class exam, with the first part closed book and the second part open book. Missed exams will be given a 0 grade and make up exams will be given only under extenuating circumstances.

*Complaints and Concerns:* You are always welcome to talk to me to express complaints and concerns about the class.

*Plagiarism etc:* Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks, which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic).

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<tr>
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<th>ATM693</th>
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<tbody>
<tr>
<td>Attendance</td>
<td>10%</td>
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<tr>
<td>Class participation</td>
<td>10%</td>
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<td>&amp; homework discussions</td>
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<td>Class group project</td>
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<tr>
<td>Homework</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
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**General Advice:** Air-sea interaction is not something you read and memorize, rather it is something you learn how to do. Try the following study procedure:

1. Read the material prior to lecture, so that you will know what it's about.
2. Listen carefully to the lecture and take notes, ask questions and participate. This is a substantial part of your grade and could mean the difference between a letter grade in the end. Also, this is a good opportunity for you to practice how science is done.
3. There is a two-step process in learning this material well. First you must solve the math and then second, think about the physical interpretation of the results. I will at times leave out steps in the derivations (but describe how to get from point a to b). I recommend that you work out the missing steps to help your understanding of the where the equations come from.
4. This is crucial: *Do not go back and read and re-read* the chapter until you "understand it." Rather, start working the problems and then go back through the chapter to clarify points as they come up. Sometimes it is helpful to read relevant
sections in other texts to see alternate ways of presenting the material. Air-sea interaction is a relatively young subject so there are not always standard explanations for phenomena, as in more mature scientific disciplines.

**Disabilities Services:**
The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (Whitaker 208, 474-5655) to provide reasonable accommodation to students with disabilities.

### CLASS CALENDAR

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>W</td>
<td>01/20/16</td>
<td>1. Intro: Role of air-sea interactions in theory of climate</td>
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<tr>
<td>2</td>
<td>M</td>
<td>01/25/16</td>
<td>2. Air-sea momentum transfer</td>
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<tr>
<td></td>
<td>W</td>
<td>01/27/16</td>
<td>3. Fluxes and forces in air-sea momentum transfer</td>
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<tr>
<td>3</td>
<td>M</td>
<td>02/01/16</td>
<td>4. Air-sea heat and vapor transfers</td>
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<tr>
<td></td>
<td>W</td>
<td>02/03/16</td>
<td>5. Air-sea heat and vapor transfers (cont)</td>
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<tr>
<td>4</td>
<td>M</td>
<td>02/08/16</td>
<td>6. Computer lab</td>
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<td></td>
<td>W</td>
<td>02/10/16</td>
<td>7. Air-sea gas transfers (Homework #1 due)</td>
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<tr>
<td>5</td>
<td>M</td>
<td>02/15/16</td>
<td>8. Wind wave phenomenon</td>
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<tr>
<td></td>
<td>W</td>
<td>02/17/16</td>
<td>9. Wind waves and their role in air-sea transfers</td>
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<td>6</td>
<td>M</td>
<td>02/22/16</td>
<td>10. Atmospheric and oceanic mixed layers: Laws</td>
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<td></td>
<td>W</td>
<td>02/24/16</td>
<td>11. Atmospheric and oceanic mixed layers: Tour</td>
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<td>M</td>
<td>02/29/16</td>
<td>12. Atmospheric and oceanic mixed layers: Interplay</td>
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<td>03/02/16</td>
<td>13. Atmospheric mixed layer in the Arctic</td>
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<td>03/07/16</td>
<td>14. Computer lab</td>
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<td>03/09/16</td>
<td>15. Oceanic mixed layer in the Arctic (Homework #2 due)</td>
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<td></td>
<td>03/14/16</td>
<td>Spring break</td>
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<td>03/16/16</td>
<td>Spring break</td>
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<tr>
<td>9</td>
<td>M</td>
<td>03/21/16</td>
<td>16. Large-scale vertical air-sea interactions: atmospheric hot towers and oceanic deep convection</td>
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<td></td>
<td>W</td>
<td>03/23/16</td>
<td>17. Ascent of moist air in hot towers</td>
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<td>10</td>
<td>M</td>
<td>03/28/16</td>
<td>18. Oceanic deep water convection</td>
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<td>W</td>
<td>03/30/16</td>
<td>19. Ocean heat gain and loss</td>
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<td>11</td>
<td>M</td>
<td>04/04/16</td>
<td>20. Oceanic heat transports</td>
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<td>04/06/16</td>
<td>21. Computer lab</td>
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<td>04/11/16</td>
<td>22. Heat conversion in the North Atlantic Ocean’s overturning circulation (Homework #3 due)</td>
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<td>04/13/16</td>
<td>23. El Niño: Air-sea interactions in the tropics</td>
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<tr>
<td>13</td>
<td>M</td>
<td>04/18/16</td>
<td>24. El Niño: Teleconnections to remote parts of the globe</td>
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<tr>
<td></td>
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<td>04/20/16</td>
<td>25. Mid-latitude air-sea interactions</td>
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<tr>
<td>14</td>
<td>M</td>
<td>04/25/16</td>
<td>26. Ice as a product of high-latitude air-sea interactions</td>
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<td></td>
<td>W</td>
<td>04/27/16</td>
<td>27. Air-sea interactions in models of different complexity</td>
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<tr>
<td>15</td>
<td>M</td>
<td>05/02/16</td>
<td>28. Final discussion of homework, group project presentations</td>
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<tr>
<td></td>
<td>W</td>
<td>05/04/16</td>
<td>29. Quiz</td>
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