SYLLABUS: MTH 411/511 Real Analysis
3 credits, 9:00-9:50am MWF, Fall 2015, BAT 250

Professor Ossiander, Kidder 298B, ossiand@math.oregonstate.edu
Office hours, MW 10:30-11:30am, F 1:30-2:30pm, and by appointment.

Catalog Description: MTH 411/511, MTH 412/512, MTH 413/513
Real Analysis: Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications. Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini’s theorem, and applications to Fourier transforms and probability.

Enforced Prerequisites for MTH 411: MTH 312 and MTH 341

Course Content: This course is the first in a 3 term sequence in real analysis. It is assumed that students have previously taken an introductory real analysis course such as OSU’s Advanced Calculus. The goal of the course is to give a systematic and rigorous introduction to real analysis. Topics covered in the first term will include properties of metric spaces and an introduction to Lebesgue measure and integration on the real line including the major convergence theorems.

The Learning Outcomes expected for students enrolled in this class are as follows.

Students satisfactorily completing MTH 411 should be able to:

- Construct correct, thorough, and efficient mathematical arguments using the basic properties of metric spaces.
- Construct correct, thorough, and efficient mathematical arguments using the basic properties of Lebesgue measure in the setting of the real line.
- Apply the basic convergence theorems of Lebesgue integration in the setting of the real line.

Students satisfactorily completing MTH 511 should be able to:

- Construct correct, thorough, and efficient mathematical arguments using the basic properties of metric spaces.
- Construct correct, thorough, and efficient mathematical arguments using the basic properties of Lebesgue measure in the setting of the real line.
• State, prove, and apply the basic convergence theorems of Lebesgue integration in the setting of the real line.

**Required Textbook:** ‘Real Analysis’ by N.L. Carothers, published by the Cambridge University Press.
The goal this term is to cover selected topics from Parts One and Two and most of Part Three.

**Class plan:** New material will be covered in lecture daily with weekly homework assignments due every Friday. There will be one in-class midterm and a comprehensive final examination.

**Homework** is an important component of the class. It will typically be assigned on Friday and collected the following Friday. Assignments will be announced in class and posted on the class website: http://www.math.oregonstate.edu/~ossiand/411-511-2015.html
Students are encouraged to discuss problems with other students, but all homework submitted is expected to be written independently. It is also expected that submitted homework is either typeset or written clearly and legibly. Late homework submission is strongly discouraged.

**Examinations:** There will be one in-class midterm and a comprehensive final exam. The date of the midterm will be announced at least 2 weeks in advance. The final examination is scheduled on Tuesday, December 8 from 6:00pm to 7:50pm. There will be no make-up examinations given.

**Mastery of the learning outcomes will be assessed** for each student via evaluation of homework and examinations. Evaluation of MTH 411 students will be differentiated from that of MTH 511 students.

**Grade assignments** for the class will be based on the following allocation.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Homework</td>
<td>150 points</td>
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<tr>
<td>Midterm</td>
<td>150 points</td>
</tr>
<tr>
<td>Final Exam</td>
<td>200 points</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>500 points</strong></td>
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All students are expected to adhere to OSU’s Student Conduct Code; see http://studentlife.oregonstate.edu/studentconduct/offenses-0.

**Statement Regarding Students with Disabilities:** Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.