Instructor: Dr. Chal Benson,
- Office: 215 Austin Bldg.
- Phone: (252) 328-6574,
- Email: bensonf@ecu.edu,
- Web: http://core.ecu.edu/math/bensonf/

Meeting times: Tuesday and Thursday 2:00-3:15 p.m. in Austin 206.

Office hours: Tues/Thurs 12:15-2:00, Weds 10:30-12:00


Other Useful References: (in our campus library):

Prerequisites: Math/5101 (Advanced Calculus I)

Important dates:
- Tues March 5, Thurs March 7 - Spring break, *(no class these days).*
- Weds March 20 - Last day to drop courses without grades.
- Tues April 23 - No class this day (State holiday makeup day).
- Thurs April 25, 2:00-4:30 - Last class to be held during the final examination period.

Grades:
- class participation - 5%
- course notes - 10% (As the course proceeds you should produce a comprehensive list of definitions and a comprehensive list of theorems. These will be due on Thurs April 25.)
- homework - 85% (Late homework will not be accepted.)

Overall course grades $g$ are assigned letter grades according to the following scale.

<table>
<thead>
<tr>
<th>$g$</th>
<th>Grade</th>
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<tbody>
<tr>
<td>$90% \leq g$</td>
<td>A</td>
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<tr>
<td>$80% \leq g &lt; 90%$</td>
<td>B</td>
</tr>
<tr>
<td>$70% \leq g &lt; 80%$</td>
<td>C</td>
</tr>
<tr>
<td>$g &lt; 70%$</td>
<td>F</td>
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</tbody>
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Typography: Your submitted homework and course notes should be typewritten. The preferred system and de facto standard for typesetting mathematics is LaTeX.
This is freely available for PC, Mac and UNIX systems. To install LaTeX on your computer visit [http://www.ams.org/publications/authors/tex/public-domain-tex](http://www.ams.org/publications/authors/tex/public-domain-tex).

**Course Outline:** The main topic in this course is the Theory of Integration. There are some drawbacks to the familiar Riemann integral. Suppose for example that you have a sequence of Riemann integrable functions $f_n(x)$ defined on some interval $[a, b]$ and that $f(x) = \lim_{x \to \infty} f_n(x)$ holds for all $x \in [a, b]$. We would like to have

$$\int_a^b f(x)dx = \lim_{x \to \infty} \int_a^b f_n(x)dx,$$

but unfortunately $f(x)$ need not be Riemann integrable. These deficiencies can be circumvented by introducing a more recent and sophisticated theory of integration, due to Henri Lebesgue (1875-1941).

Every Riemann integrable function is Lebesgue integrable and the two integrals coincide. There are, however, Lebesgue integrable functions that fail to be Riemann integrable. Thus, Lebesgue’s theory expands the class of functions that one can integrate. A key ingredient in the new theory is the idea of Measure. The Lebesgue measure of a subset in $\mathbb{R}^n$ is its “volume” (think length or area when $n=1$ or 2). The definition and properties of the Lebesgue integral rest on the theory of Lebesgue measure. One must be able to assign measure to very general subsets of $\mathbb{R}^n$. The theory of integration will first be developed on the real line ($\mathbb{R}^1$). Later, we will generalize to $\mathbb{R}^n$ and to very general spaces where some suitable measure is defined.

**Compliance with ADA:** East Carolina University seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Department for Disability Support Services located in Slay 138 ((252) 737-1016 (Voice/TTY)).

**Academic integrity:** Academic integrity is a fundamental value of higher education and East Carolina University; therefore, I will not tolerate acts of cheating, plagiarism, falsification or attempts to cheat, plagiarize or falsify. Should I determine that an academic integrity violation has taken place, I reserve the right either to assign a grade penalty or to refer the case to the Office of Student Rights and Responsibilities for an Academic Integrity Board hearing. I will assign a grade penalty up to an F for the test or course. Should it come to my attention that you have had a prior academic integrity violation, or if there are other aggravating circumstances, I will refer the case directly to the Office of Student Rights and Responsibilities. Should the Academic Integrity Board determine that you committed an academic integrity violation, you may be assigned a grade penalty and/or any other sanction allowed in the student Code of Conduct, up to and including suspension from the University. The Student Handbook is online.

**Attendance:** Students are expected to attend punctually all lectures.