FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—COURSE CHANGE REQUEST[1]

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
CATALOG _____

DEPARTMENT MATHEMATICAL SCIENCES	COLLEGE CHARLES E. SCHMIDT COLLEGE OF SCIENCE
COURSE PREFIX AND NUMBER MAA 6306	CURRENT COURSE TITLE Real Analysis 1
CHANGE(S) ARE TO BE EFFECTIVE (LIST TERM) SPRING 2017	____ TERMINATE COURSE (LIST FINAL ACTIVE TERM)
CHANGE TITLE TO: REAL ANALYSIS CHANGE PREFIX FROM: TO: CHANGE COURSE NO. FROM: TO: CHANGE CREDITS[2] FROM: TO: CHANGE GRADING FROM: TO: CHANGE DESCRIPTION TO: Abstract measure theory. The Lebesgue integral. Convergence, Radon Nikodym, and Fubini theorems. L^p spaces and selected topics.	CHANGE PREREQUISITES/MINIMUM GRADES TO*: (MAA 5229 WITH A GRADE OF "C" OR HIGHER) (ORIGINAL PREREQUISITES: NONE) CHANGE COREQUISITES TO*: CHANGE REGISTRATION CONTROLS TO: *Please list both existing and new pre/corequisites, specify AND or OR, and include minimum passing grade.
Faculty contact, email and complete phone number: Tomas Schonbek, schonbek@fau.edu , 561-297-3355	**Attach syllabus for ANY changes to current course information.**
Should the requested change(s) cause this course to overlap any other FAU courses, please list them here:	Please consult and list departments that might be affected by the change(s) and attach comments.[3] N/A

Approved by:	*Date:*
Department Chair: R. Rios	8/25/16
College Curriculum Chair:	10/21/16
College Dean: Dr. Charles Roberts	10/21/2016
UGPC Chair:	
Graduate College Dean:	
UFS President:	
Provost:	

1. **Syllabus** must be attached; see guidelines for requirements: *www.fau.edu/provost/files/course syllabus.2011.pdf*

2. Review **Provost Memorandum: Definition of a Credit Hour** *www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf*

3. **Consent** from affected departments (attach if applicable)

Email this form and syllabus to *UGPC@fau.edu* **one week before** the University Graduate Programs Committee meeting.

Syllabus

1. COURSE TITLE	COURSE NUMBER	CREDIT HOURS
Real Analysis	MAA 6306	3

2. COURSE PREREQUISITES
MAA 5229 Introductory Analysis 2 with a grade of "C" or higher

3. COURSE LOGISTICS

a. Spring 2017.
b. Taught in lecture-discussion style in-person (not online).
c. Course location is specified in the FAU course schedule.

4. INSTRUCTOR CONTACT INFORMATION
Tomas Schonbek, Office SE 288
Phone: (561) 297-3355, fax (561) 297-2436
E-mail address: schonbek@fau.edu
Office hours: Monday and Wednesday 9:30am–11:30am

5. TA CONTACT INFORMATION
N/A

6. COURSE DESCRIPTION
Abstract measure theory. The Lebesgue integral. The Lebesgue Convergence, Radon Nikodym, and Fubini theorems. L^p spaces and selected topics.

7. COURSE OBJECTIVES
This course is a steppingstone for other courses; the topics students learn in this course are part of the standard tool kit of all mathematicians specializing in any of the many areas of mathematical analysis. Upon successful completion of the course, students will have learned the basics of measure theory and integration and be prepared to take advanced courses in differential equations, probability, functional analysis and physics.

8. COURSE EVALUATION METHOD
There will be three homework projects $\{H_1, H_2, H_3\}$, each having a maximum score of 20 points. Homework project H_1 will be assigned in the 3rd week of classes, homework project H_2 will be assigned in the 7th week of classes, and homework project H_2 will be assigned in the 11th week of classes. The exact assignment due date will be specified on each assignment. Graded homework projects will be returned in class or can be picked up during office hours in the instructor's office.
In addition, there is a cumulative final exam, which is scheduled in accordance with FAU's final exam schedule. The maximum score for the final exam is 40 points.

9. COURSE GRADING SCALE

Your overall grade in the course is derived from your cumulative performance as follows:

1) The points from the items H_1, H_2, H_3 and the final exam are added, yielding a final number of points $0 \leq P \leq 100$.
2) Your grade is derived from P according to the following table.

Value of *P*	Grade
>94	*A*
>90 – 94	*A-*
>87 – 90	*B+*
>83 – 87	*B*
>80 – 83	*B-*
>75 – 80	*C+*
>65 – 75	*C*
>60 – 65	*C-*
>57 – 60	*D+*
>53 – 57	*D*
>50 – 53	*D-*
<50	*F*

10. POLICY ON MAKEUP TESTS, LATE WORK, AND INCOMPLETES

If you cannot complete an assignment in due time to a relevant and documented reason, you can make up the respective assignment. Extra credit work is not possible.

A grade of *I* (incomplete) will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student has to show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

11. SPECIAL COURSE REQUIREMENTS

N/A

12. CLASSROOM ETIQUETTE POLICY

N/A

13. DISABILITY POLICY STATEMENT

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) located in Boca Raton - SU 133 (561-297-3880), in Davie - MOD I (954-236-1222), in Jupiter - SR 117 (561-799-8585), or at the Treasure Coast - CO 128 (772-873-3305), and follow all OSD procedures.

14. CODE OF ACADEMIC INTEGRITY POLICY STATEMENT

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf .

15. REQUIRED TEXTS/READINGS

A standard textbook for the course is *Real Analysis*, by H.L. Royden and P.M. Fitzpatrick, 4th Edition, Pearson 2010.

16. SUPPLEMENTARY READINGS

The following references can supplement the material covered in class.

- L.C. Evans and R.F. Gariepy, Measure Theory and Fine Properties of Functions, CRC Press, Taylor and Francis Group, 2015.
- Kenneth Falconer, Fractal Geometry, Mathematical Foundations and Applications, Third edition, Wiley 2014.

17. COURSE TOPICAL OUTLINE

The following topics are to be covered. The exact duration per topic will vary in dependence on prior experience of the class participants, but a typical duration per topic is two to two and a half weeks.

1) General Measure Spaces. The Hahn and Jordan decompositions and the Caratheodory extension theorem.

2) Integration over general measure spaces, the convergence theorems of Egoroff, Fatou and Lebesgue.

3) Derivation of measures and the Radon-Nikodym Theorem.

4) General L^p spaces. Completeness of these spaces and duality theorems. The theorems of Alaoglu and Dunford-Pettis.

5) Product measures. The theorems of Fubini and of Fubini-Tonelli. Lebesgue measure in R^n.

6) An introduction to Hausdorff measure and Hausdorff dimension.

18. WEEKLY SCHEDULE

Week # 1: General Measure Spaces. The Hahn and Jordan decompositions.

Week #2: Outer measures. The Caratheodory extension theorem.

Week #3: Measurable functions. Integration of non-negative measurable functions. The Lebesgue integral in a general measure space. First properties.

Week #4: The theorems of Egoroff, Fatou; Lebesgue's monotone convergence theorem and Lebesgue's dominated convergence theorem.

Week #5: Absolutely continuous and singular measures with respect to a positive measure.

Week #6: The Radon-Nikodym and the Lebesgue decomposition theorems. Derivation of measures.

Week #7: A brief introduction to normed vector spaces and Banach spaces.

Week #8: General L^p spaces. Completeness of these spaces.

Week #9: The $(L^p, L^{p'})$ duality, $\frac{1}{p} + \frac{1}{p'} = 1$.

Week #10: Weak and strong convergence in L^p spaces; the theorems of Alaoglu and of Dunford-Pettis.

Week #11: The product of measures spaces; product measures.

Week #12: The theorems of Fubini and Fubini-Tonelli

Week #13: Lebesgue measure in R^n. Change of variables.

Week #14: An introduction to Hausdorff measure.

Week #15: Hausdorff dimension. Fractals.