LAKE SUPERIOR STATE UNIVERSITY

College of Natural and Mathematical Sciences **Fall 2012**
MATH490 Research Topics in Mathematics: The Fourier Integral (3,0) **3 Credits**

Prerequisites: Junior/Senior Status in Mathematics and Instructor Approval

Instructor(s): George Voutsadakis
CASET Hall, Room 206E
906-635-2667
Email: gvoutsad@lssu.edu

Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
9:00-10:00	9:00-10:00	2:00-3:00	9:00-10:00	9:00-10:00

Required Texts: The Fourier Integral and Its Applications, Papoulis

Recommended Text: None

Course Description: Definition of the Fourier Integral. Study of basic theorems, including the Convolution Theorem and the Fourier Integral Theorem. Derivation of some key Fourier Transforms with special importance in signal analysis. Study of Fourier series and some related more advanced theorems including Poisson's Sum Formula, and the Sampling Theorem. As time permits, applications to Linear Systems and analysis of some special kinds of filters.

Course Objectives: At the conclusion of MATH 490 students should be able to:
1. Clearly define Fourier Transforms and Fourier Series and recognize their importance.
2. Use properties of Fourier Integrals to work several examples useful in signal analysis.
3. Be able to decipher the meaning of key theorems and to understand some proofs.
4. Be able to apply identities and theorems of Fourier analysis in relevant applications.

Grading Scale and Policies:
Point and Percentage Values:

Homework and Problem Solving	50 points	50%
A Written Report	25 points	25%
A Final Presentation	25 points	25%
	Total 100 points	Total 100%

Grading Scale:

94-100	A	70-74	C
90-93	A-	65-69	C-
87-89	B+	60-64	D+
84-86	B	55-59	D
80-83	B-	50-54	D-
75-79	C+	0-49	F

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***University Policies and Statements*:**

The Americans with Disabilities Act & Accommodations

In compliance with Lake Superior State University policies and equal access laws, disability-related accommodations or services are available to students with documented disabilities.

If you are a student with a disability and you think you may require accommodations you must register with Disability Services (DS), which is located in the KJS Library, Room 130, (906) 635-2355 or x2355 on campus. DS will provide you with a letter of confirmation of your verified disability and authorize recommended accommodations. This authorization must be presented to your instructor before any accommodations can be made.

Students who desire such services should meet with instructors in a timely manner, preferably during the first week of class, to discuss individual disability related needs. Any student who feels that an accommodation is needed – based on the impact of a disability – should meet with instructors privately to discuss specific needs.

IPASS (Individual Plan for Academic Student Success)

If at mid-term your grades reflect that you are at risk for failing some or all of your classes, you will be contacted by a representative of IPASS. The IPASS program is designed to help you gain control over your learning through pro-active communication and goal-setting, the development of intentional learning skills and study habits, and personal accountability. You may contact 635-2887 or email ipass@lssu.edu if you would like to sign up early in the semester or if you have any questions or concerns.

Tentative Course Outline

The Student(s) and the Instructor will work through Part One and Part Two of the textbook so as to develop a good understanding of Fourier Integrals and their basic properties, as well as relevant theorems.
The students will solve several problems to develop a good grasp of the material and will prepare adequately to be able to present the proofs of some basic theorems.
Several examples and applications will be worked out as needed to solidify and reinforce understanding.

Weekly meetings will be set up where progress towards our goals will be monitored. During these weekly meetings, a gradual preparation of both the classwork report and of the final presentation will be discussed and carried out.
During the last week of classes the student(s) will rehearse and finalize a power point document and during Finals Week, they will give an open lecture on Fourier Integrals (including definitions, some basic properties, some examples, some theorems and some applications).

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Tentative Studying Schedule:

Week	Dates	Monday	Wednesday	Friday
1	08/27/12	1-1	1-2	1-3
2	09/03/12	BREAK	1-4	1-5
3	09/10/12	2-1	2-2	2-3
4	09/17/12	2-4	2-5	2-6
5	09/24/12	3-1	3-2	3-3
6	10/01/12	3-4	3-5	4-1
7	10/08/12	4-2	4-3	4-4
8	10/15/12	4-5	5-1	5-2
9	10/22/12	5-3	6-1	6-2
10	10/29/12	6-3	6-4	6-5
11	11/05/12	7-1	7-2	7-3
12	11/12/12	7-4	7-5	7-6
13	11/19/12	7-7	8-1	BREAK
14	11/26/12	8-2	8-3	Review
15	12/03/12	Rehearsal	Rehearsal	Rehearsal