10-day

Submit original with signatures + 1 copy + electronic copy to UAF Governance.

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & courses

	(Every or Alternate) Fall, Spring, Summer — or As Demand Warrants

7. *SEMESTER & YEAR OF FIRST OFFERING* (if approved)	Spring ~~2013~~ 2014

8. *COURSE FORMAT:*

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

MSL 632: Oceanographic Data Analysis and Visualization (3+0 credits)
This course introduces students to data analysis and visualization techniques commonly applied to oceanographic datasets. Students will gain a theoretical and practical understanding of propagation of errors, linear least squares regression, and time series analyses such as correlation, coherence and spectral estimation. The course will also cover Empirical Orthogonal Function (EOF) analysis. A significant portion of the class will be a project that will give students an opportunity to learn a data analysis technique suited to their research. Matlab will be used throughout. **Prerequisites: Graduate Standing; MATH 202; MATH 314 or permission of instructor.**

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17

RESTRICTIONS ON ENROLLMENT (if any)	
14. PREREQUISITES	**Graduate standing; MATH 202; MATH 314 or permission of instructor.**

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

Classes, etc. that student is strongly encouraged to complete prior to this course.	
15. SPECIAL RESTRICTIONS, CONDITIONS	**NONE**

16. PROPOSED COURSE FEES	**$0**	

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (ffkli@uaf.edu, 474-6695) with regard to

	Date		

Signature, Chair, College/School Curriculum Council for:	

	Date	6/18/2012	

Signature, Dean, College/School of: Arctic	SFOS

	Date		

Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date		

Signature, Chair, UAF Faculty Senate Curriculum Review Committee

ADDITIONAL SIGNATURES: (If required)

	Date		

Signature, Chair, Program/Department of:	

		Date	

Signature, Chair, College/School Curriculum Council for:	

Signature, Dean, College/School of:	

ATTACH COMPLETE SYLLABUS (as part of this application).
Note: syllabus must follow the guidelines discussed in the Faculty Senate Guide http://www.uaf.edu/uafgov/faculty/cd/syllabus.html.
The department and campus wide 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 change will 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:
θTitle, θ number, θcredits, θprerequisites, θ location, θ meeting time
(make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:

θ Name, θ office location, θ office hours, θ telephone, θ email address.

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

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

Last edit: 9/5/12

MSL 632 New Course: Oceanographic Data Analysis and Visualization (3 credits)

Instructor:
Dr. Harper Simmons
Rm. 127 O'Neill building
Phone: 474-5729
[redacted]

Class meeting times: TBA
Location: TBA
Office Hours: MWF 11-noon

[redacted]

[redacted]

Class Participation:	200	points
Project Presentation:	200	points
Projects Paper:	200	points
Total	1200	points

For the project, each student will prepare a lecture on a data analysis or visualization project relevant to their research, or as agreed upon with the instructor. Along with the

Grading scale:
For homework and the final grade letter grades will correspond to the following percentages.

A+	98-100%	A	93-97%	A-	90-92%	
B+	87-89%	B	83-86%	B-	80-82%	
C+	77-79%	C	73-76%	C-	70-72%	
D+	67-69%	D	63-66%	D-	60-62%	F<60%

Assignments

A progression of 6 assignments will be given based on the exploration of 1, 2 and 3-dimensional datasets. Datasets will be processed and visualized with step-by-step guidelines, using class-distributed matlab code or, upon instructor approval, tools that students are comfortable with. A questions set about the data will be distributed. These

information "truthfully", fitting data to models, identifying modes of variance, et cetera.

of the SFOS IT group if necessary. If needed, the students can also enlist the assistance of the Student Writing Center.

[redacted]

[redacted]

Course Schedule and Lecture Topics (SUBJECT TO CHANGE)

Note that the course content may be adjusted to student needs and interests

Course components:

Week 1: Introduction to ocean data

reading: Emery and Thompson, Ch. 1.1 – 1.4

a) How are seawater properties, velocity, et cetera, measured.

b) Principles of instruments, how do instruments work

[redacted]

c) What do data look like?

Week 2: Introduction to Matlab

reading: Getting started with Matlab (PDF handout)

a) Data handling

b) Reading and formatting of data

c) Basic data manipulation & visualization

Week 3: Noise and uncertainty in data

reading: Emery and Thompson, Ch 2

a) Physical noise, measurement error, model error

b) Propagation of errors

c) Instrumentation issues

Week 4-5: Least Squares linear regression

Week 6: Harmonic Analysis

Week 7: Tidal analysis

Week 7-9: Spectral estimation: Periodograms

Week 10: Filtering in the time and frequency domain

Week 11: Spatial analyses of data fields

reading: Emery and Thompson, Ch. 4.1-4.3

Gridding: block averaging, objective analysis, empirical orthogonal functions

Week 12: Concepts of visualization

a) Curve fitting, regression, correlation, et cetera
b) Harmonic analysis and de-tiding of data
c) Interpolation of gappy data
d) Errors, noisy data

Week 15: Visualization, part II
reading: Tufte handout

a) Image quality, vector vs. raster graphics, color, publication considerations

b) Animation, file formats, display software
c) Map projections

Week 16: Student presentations