FORMAT 1

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 & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	GPMSL	**College/School**	SFOS
Prepared by	Z. Kowalik	**Phone**	474-7753
Email Contact	zkowalik@alaska.edu clneumann@alaska.edu	**Faculty Contact**	Z. Kowalik

1. ACTION DESIRED (CHECK ONE): Trial Course [ ] New Course [Yes]

2. COURSE IDENTIFICATION: Dept [MSL] Course # [622] No. of Credits [3]

Justify upper/lower division status & number of credits: **Upper division with basic background in physics, hydrodynamics and mathematics (intro to calculus); 3credits**

3. PROPOSED COURSE TITLE: **Tides-their Nature and Impacts**

4. To be CROSS LISTED? *YES/NO* [No] If yes, Dept: [ ] Course # [ ]

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. To be STACKED? *YES/NO* [No] If yes, Dept. [ ] Course # [ ]

6. FREQUENCY OF OFFERING: **Spring, Even-numbered Years**

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (if approved) **Spring, 2012**

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)	[ ] *1*	[ ] *2*	[ ] *3*	[ ] *4*	[ ] *5*	[X] *6 weeks to full semester*
OTHER FORMAT (specify)						
Mode of delivery (specify lecture, field trips, labs, etc)	**Class-room lectures supplemented by numerical calculations of tidal parameters**					

9. CONTACT HOURS PER WEEK: [3] LECTURE hours/weeks [ ] LAB hours /week [ ] PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty/cd/credits.html for more information on number of credits.

OTHER HOURS (specify type) [ ]

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

Course Title: Tides-their Nature and Impacts; Credits: 3

Course Description: It will provide students in marine sciences with in-depth knowledge on tides and the role of tides in the physical, biological, chemical and geological processes in the oceans. We will investigate importance of tides for the coastal regions of the Bering Sea and North Pacific. We will also cover associated aspects such as tidal currents and their role

to GOV. COUNCIL 12/16/10

in transport of sediments, zooplankton and fish larvae, harnessing the tidal power for the generation of electricity and impact of tides on climate. Prerequisites: MSL F620, Math F201X), or instructor's permission. (3+0)

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities [ ] S = Social Sciences [ ]

Will this course be used to fulfill a requirement for the baccalaureate core? YES [ ] NO [ ]

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6 [ ] W = Writing Intensive, Format 7 [ ] Natural Science, Format 8 [ ]

12. COURSE REPEATABILITY:

Is this course repeatable for credit? YES [ ] NO [x]

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit? [ ] TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course? [ ] CREDITS

13. GRADING SYSTEM: *Specify only one.*

LETTER: [X] PASS/FAIL: [ ]

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES MSL F620, Math F201X), or instructor's permission

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

Has a memo been submitted through your dean to the Provost & VCAS for fee approval? Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? Yes/No: yes

If yes, give semester, year, course #, etc.: Spring Semester 2004 and Spring Semester 2006, MSL 697, MSL F 693 F01. Title: Tides: Nature & Impacts, and also as individual study course and Physical Oceanography Seminar.

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

Salary support of instructor and long-distance delivery. This course will be part of Dr. Kowalik regular workload for teaching.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No [ ] Yes [x]

Adequate media facilities are available within SFOS, and collections at the UAF main and satellite libraries and with the instructors. Supplemental hand-outs of publications will be provided to the students as appropriate. I have discussed on Oct. 25, 2010 with A. Christie from Bio-Science library the scope of the course.

20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

All programs in SFOS will be affected by this action as tides have strong influence on fishery (e.g. spawning grounds), biology (transport of nutrients and plankton), chemistry (mixing) and physics (tide is one of the major forcing in oceans).

21. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Students in geology, chemistry and biology (as well in physical oceanography) will acquire a comprehensive understanding on how tides shape physics, biology, chemistry and geology in the World Ocean. This background will provide them with expertise to address practical issues relating to their field of research.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

The course will describe tidal phenomena to both specialists and non-specialists who need some knowledge of tidal processes, including physical oceanographers, geologists of beach or marine sedimentation processes, and biologists who explore interconnection of tides and ocean life. Mathematics will be kept to a minimum.

The purpose of the course is to provide basic background on tides and describe significance of tides for life in the ocean and for harnessing the power, topics which are not being covered in any of the present courses at UAF. This course will help students to develop a quantitative knowledge of the tidal dynamics and acquire tools to solve practical problems in the shelf environment. The course will include description of the tidal influence on the mixing of the vertically stratified waters, transport of nutrients and sediments. The students will learn the principles of the tidal pumping mechanism for transporting nutrient-rich offshore water into the shallower regions. The course will also include discussions on the possible effect of tides on periodical climate change, and catastrophic sea level changes caused by storm surge and perigean tide (tides of increased range).

APPROVALS:

Signature, Chair, Program/Department of: GPOR SL	Date	10/13/10
Signature, Chair, College/School Curriculum Council for: SFOS	Date	12/14/10
Signature, Dean, College/School of: SFOS	Date	12/15/10
Signature of Provost (if applicable)	Date	

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: (As needed for cross-listing and/or stacking)

	Date	

Signature, Chair, Program/Department of:

	Date	

Signature, Chair, College/School Curriculum Council for:

	Date	

Signature, Dean, College/School of:

ATTACH COMPLETE SYLLABUS (as part of this application).

Note: The guidelines are online: 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:**
   ❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
   (make sure that contact hours are in line with credits).
2. **Instructor (and if applicable, Teaching Assistant) information:**
   ❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.
3. **Course readings/materials:**
   ❑ Course textbook title, ❑ author, ❑ edition/publisher.
   ❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
   ❑ any supplies required.
4. **Course description:**
   ❑ Content of the course and how it fits into the broader curriculum;
   ❑ Expected proficiencies required to undertake the course, if applicable.
   ❑ Inclusion of catalog description is *strongly* recommended, and
   ❑ Description in syllabus must be consistent with catalog course description.
5. ❑ **Course Goals (general), and (see #6)**
6. ❑ **Student Learning Outcomes (more specific)**
7. **Instructional methods:**
   ❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).
8. **Course calendar:**
   ❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.
9. **Course policies:**
   ❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.
10. **Evaluation:**
    ❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and
    ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.)
11. **Support Services:**
    ❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.
12. **Disabilities Services:**
    The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials.
    ❑ State that you will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities."

Syllabus for: MSL 622: Tides –their Nature and Impacts

Instructor: Dr. Zygmunt Kowalik
School of Fisheries and Ocean Sciences
118 O'Neill

907-474-7753
ffzk@ims.uaf.edu

Class meeting times: TBA
Location: TBA
Office hours: By appointment

Course Description.
It will provide students in marine sciences with in-depth knowledge on tides and the role of tides in the physical, biological, chemical and geological processes in the oceans. We will investigate importance of tides for the coastal regions of the Bering Sea and North Pacific. We will also cover associated aspects such as tidal currents and their role in transport of sediments, zooplankton and fish larvae, harnessing the tidal power for the generation of electricity and impact of tides on climate.
The tidal currents will be the main topic considered throughout this course. As strong coastal tidal currents are obvious factors in marine processes, the open ocean vertical mixing, nutrients transport, sedimentation and thermal balance are also linked to the tidal currents. Along with the above 'standard' oceanographic topics the course will aim to introduce the current issues including climate change and tidal energy sources. We will explore the well known 18.6-yr lunar tide period and show how it generates the cyclic changes in marine biological productivity. We will demonstrate that tides are a potential natural source of energy for the generation of electricity and also we will discuss an environmental impact of tidal power development.
Students will gain the knowledge on tides through the lectures and books. The practical knowledge will be gained through the series of numerical exercises on tidal analysis and prediction. Students will be evaluated through the exams and based on their solution of the numerical assignments.

Course Goals and Learning Objectives:
The goal of this course is to provide students with expertise in their professional careers to understand and address the influence of tides on practical issues related to physics, geology and biology of oceans. They will also acquire suitable quantitative tools to continue their own research. Specific learning outcomes include:
1. Student will learn the physics of tide-generating forces and the main periodicities related to tides.
2. Students will become familiar with the basic laws of tide propagation and will be able to explain primary features of the observed tides.
3. Through the series of simple numerical exercises the students will acquire the quantitative skill, which will allow to solve problems related to tides such as estimation of the influence of the tides on transport processes in the ocean (sediments, pollutants, fish larvae and zooplankton), or estimation sources and sinks of the tidal energy for the tidal power development.

Course Policies and Requirements:

Check your e-mail regularly, and be sure I have your current contact information throughout the semester. Class information, updates, readings, and changes to the schedule will be distributed via e-mail.

Class participation and home assignments are expected from ALL students. Points for class participation will be applied toward the final grade, as indicated below.
One **midterm** and one **final** exam will be given during the course. These exams will be written, closed-book. The final exam will include material presented throughout the semester.

Home assignments will play the major role in this educational process. A series of the short practical projects will be made for the real hands–on experience in applying numerical methods for exploring the role of tides in the oceans.

Course Readings:
The hard copies of the following text books will be available in Dr. Kowalik's office to borrow and/or at the UAF Bio-Science Library,

1. Waves, tides and shallow-water processes. 1993, Open Univ. Course Team, Pergamon Press.
2. Massel S. R. 1999. Fluid mechanics for marine ecologists. Springer.
3. Mann, K. H. and J. R. N. Lazier, 1991. Dynamics of Marine Ecosystems. Blackwell Scientific Pub.

The electronic copies of the following text books will be available

1. Tides, Surges and Mean Sea-Level by D. T. Pugh. (pdf file of the book)
2. Coastal Engineering Manual (six chapters) available from the Website of US Army Corps of Engineer.
3. Lecture notes prepared by Z. Kowalik

Handouts of the important journal publications will be provided as appropriate.

Student Presentations: An assignment for a presentation will be made in the first month of the course. The specific topics related to tides and student field of interest will be chosen. The presentation will be scheduled in the second part of the semester. After and during presentation the **group discussion** will be encouraged.

A note about plagiarism: Plagiarism will not be tolerated in any way during this course. All student presentations are expected to consist of students' original ideas and/or information from properly cited published sources. Every case of plagiarism will be carefully scrutinized and the range of consequences will be from failing assignment to failing the entire course.

Grading:

Grades will be determined based on the absolute points awarded for the following requirements.

Requirements	Points	% of total
Class participation (attendance, preparedness)	10	10
Homework assignments	40	40
Midterm exam	10	10
Presentation	10	10
Final exam	30	30
Total	100pts	100%

Semester Grades will be assigned according to the following scale:

100-90 A
89-80 B
79-70 C
69-60 D
Below 59 F

Lecture Schedule (subject to change):

Week	Lecture Topic	Assignments/Readings
1 and 2	Tide-generating forces. Enumerate and discuss all forces and periodicities related to tides.	Readings: Ch.I (Tidal Forces) , pdf file, prepared by Z. Kowalik and Waves, tides and shallow-water processes. 1993, Open Univ. Course Team, Pergamon Press. Home assignment No1: 1a. Calculate magnitude of the tidal force as a function of latitude. 1b. Perform calculation and make graphics of linear and nonlinear superposition of the two tide periods.
3 and 4	Analysis and prediction of tides and tidal currents. This lecture will describe the methods to analyze sea level and currents by classic harmonic analysis and by	Readings: Ch.VI (Harmonic Analysis and Prediction), pdf file, prepared by Z. Kowalik and Coastal Engineering Manual available from the Website of US Army Corps of Engineer. Home assignment No2: Out of measured tidal currents construct

	selected modern tools related to energy spectra.	tidal ellipse. Explain a sense of rotation. Home assignment No3: For a monthly series of the sea level data perform tidal analysis. Explain periods and origin of the main tidal constituents
5 and 6	Structure of the tidal currents. Discuss the effects of intense turbulence generated by tides which erases vertical stratification and forms the tidal fronts in shallow water domains. Bering Sea and Gulf of Alaska tides.	Home assignment No4: Starting with equation of motion and continuity introduce energy equation and explain all terms. Home assignment No5: Calculate potential energy of the M2 tide in the Cook Inlet. Evaluate power which can be generated by this energy during one tidal period.
MIDTERM EXAM		
7 and 8	Tidal dynamics. Using Kelvin and Sverdrup waves to explain primary features of the observed tides.	Home assignment No6: Calculate and discuss critical latitudes for the major tidal waves
9 and 10	Introduction to numerical solutions of the tidal equations. Initially, simple problems will be addressed related to a simple geometry of a channel or rectangle.	Readings: Tides, Surges and Mean Sea-Level by D. T. Pugh. (pdf file of the book)
11	Internal tidal waves. Propagation of tides in the density-stratified fluid will be considered. The generation of large internal tides is especially important at the shelf break. The impact of these large waves and currents will be considered on transport of nutrients from the deep waters into the surface layers.	Home assignment No7: Based on the typical distribution of the water density in the Gulf of Alaska calculate the Vaisala-Brunt period of oscillations. Explain this periodicity.
12 and 13	Tidal power. Basic laws of tidal energy generation, transport and dissipation will be discussed. Harnessing the power of tides for the	Readings: Ch.IV (Tide Distribution and Tidal Power), pdf file, prepared by Z. Kowalik Home assignment No8: Describe five regions in the World

	generation of electricity will be explained. The methods for evaluation environmental impact of a tidal power development will be given.	Ocean of extreme tidal ranges. Explain physics of the high tide generation.
14 and 15	Impact of tides on climate. Tidal forces display many long periods (e.g., 2000-yr, 18.6-yrs) but the sea level change at these periods is miniscule. This lecture will discuss the mechanisms that induce these periodicities into the climate change and into bio productivity	Readings: 1. Massel S. R. 1999. Fluid mechanics for marine ecologists. Springer. 2. Mann, K. H. and J. R. N. Lazier, 1991. Dynamics of Marine Ecosystems. Blackwell Scientific Pub. 3. Charles D. Keeling and Timothy P. Whorf . Possible forcing of global temperature by the oceanic tides (pdf file)
FINAL EXAM		

Support and Disability Services:

The Office of Disability Services (203 WHIT; 474-5655; fydso@uaf.edu) implements the Americans with Disabilities Act and insures that UAF students have equal access to the campus and course materials. Students with physical or learning disabilities should contact this office, or the instructor, as soon as possible so that suitable arrangements can be made to accommodate specialized needs.