Department of Oceanography  
College of Geosciences  
Joint Degree Program, PhD in Oceanography,  
with Ocean University of China

Introduction
This is a proposal to deliver a joint PhD program in Oceanography with Ocean University of China, located in Qingdao, China, the premier university in China teaching oceanography. The degree program was conceptualized at the first China-US Relations Conference. A Memorandum of Agreement was signed between Texas A&M University and Ocean University, followed by a Supplement, an Addendum to the Supplement, and most recently an Amendment to the Addendum to clarify that this is a joint degree program. The degree is offered and awarded jointly by Texas A&M and Ocean University; both institutions share responsibility for the program's delivery and quality.

Ocean University students take the first year of their program in Qingdao, complete their PhD's in College Station funded, in part, by scholarships from the China Scholarship Council, and return to Qingdao for their defense. Texas A&M students will follow a similar pattern in reverse.

Rationale
This program offers TAMU researchers and students opportunities to use Ocean University research facilities, equipment, and ships. It further elevates Texas A&M's reputation, global visibility, and is a model for future international collaborations.

Additional Information
Following approval of the Faculty Senate, the proposal will go to the Board of Regents and the Higher Education Coordinating Board. A document demonstrating that the proposed joint PhD in Oceanography is being offered in compliance with SACS's policies and guidelines has been prepared.

Contact:

Dr. Piers Chapman  
Professor and Head, Department of Oceanography  
MS 3146 TAMU  
845-7211  
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February 4, 2009

MEMORANDUM

TO: Graduate Council
Texas A&M University

Dr. Robert C. Webb
Dean of Graduate Studies

FROM: Dr. Sarah Witham Bednarz
Associate Dean for Academic Affairs

XC: Dr. Piers Chapman
Professor and Head, Department of Oceanography

SUBJECT: Joint PhD Program, Ocean University of China and Texas A&M

Attached please find a proposal to the Texas Higher Education Coordinating Board for a joint PhD program in Oceanography from Ocean University of China and Texas A&M University. We seek approval from the appropriate councils on campus before moving this forward. It has been approved by the College of Geosciences Graduate Instruction and Curriculum Council.

Thank you for your consideration of this proposal. We would be happy to answer any questions you might have.
A PROPOSAL

to the
TEXAS HIGHER EDUCATION COORDINATING BOARD
to authorize

Texas A&M University to jointly offer
its existing

DOCTOR OF PHILOSOPHY Degree

OCEANOGRAPHY
With the Ocean University of China

prepared by:
Texas A&M University College of Geosciences and Ocean University of China
Substantive Degree Program Request - Title Page

NAME OF INSTITUTIONS Texas A&M University
Ocean University of China

NAME OF PROPOSED PROGRAM PhD in Oceanography

Display how proposed program(s) would appear on the Coordinating Board program inventory, include Texas CIP designation(s)

Oceanography
Texas CIP code: 40.0607.00

How would the name(s) of program(s) appear on student diplomas?

Doctor of Philosophy in Oceanography

Administrative unit(s) responsible for the program(s):

Department of Oceanography, Texas A&M University

Proposed date for implementation of program: September 2009

Persons to be contacted for further information about proposed program(s)

Name: Dr. Piers Chapman Title: Head, Department of Oceanography, Texas A&M University, Phone: 979/845-7211; Fax: 979/845-6331; e-mail: piers.chapman@tamu.edu

Name: Dr. Robert C. Webb Title: Interim Dean of Graduate Studies, Texas A&M University, Phone: 979/845-3631; Fax: 979/862-1692; e-mail: robert-webb@tamu.edu

Signatures:

_________________________________________
TAMU, Chief Executive Officer

_________________________________________
Date

_________________________________________
System Chief Executive Officer

_________________________________________
Date

Governing Board approval date: ____________________________________________
EXECUTIVE SUMMARY
Texas A&M University
College of Geosciences
Proposal to create a joint degree with Ocean University of China
Doctor of Philosophy in Oceanography

The Oceanography Department at Texas A&M University (TAMU) has been offering graduate degrees since the 1950s. Faculty in the Oceanography Department (OCNG) of the College of Geosciences (CLGE) at TAMU are proposing to offer the existing PhD in Oceanography as a joint degree with the Ocean University of China (OUC). The goal is to promote faculty at both institutes to work together training graduate students and enhancing graduate education and research in the field of oceanography. Both institutions have renowned oceanography programs; it is believed that combining them in this way will lead to a unique program and increase research interaction and cooperation between the two nations.

The current TAMU Oceanography Ph.D. program, which was inaugurated in 1950, consists of a broad-based course of classroom instruction and dissertation work on a topic of the student’s choice. Students study core aspects of physical, chemical, geological and biological oceanography and take specialist courses in topics of particular interest. Students in the joint program will take course work at both institutions, and complete a residency at TAMU in College Station or Galveston. The program will require 64 hours beyond the master’s or 96 hours beyond the bachelor’s, as currently required by TAMU.

It is anticipated that the majority of the students in this program will be from China, but it is also possible that U.S.-based students may wish to complete their degrees at OUC. Typically, students will do one year in China, then come to the U.S. for up to five years, funded by scholarships. Students from China will generally complete their preliminary examination in the first year of residence at Texas A&M. TAMU faculty in the program will visit and collaborate with colleagues at OUC and, similarly, OUC faculty in the program will visit TAMU. Students will have doctoral committee members from both TAMU and the OUC. They will write their dissertations in English and defend them in China, using video-conferencing to ensure TAMU participation.

The degree program will focus on independent supervised research complemented by formal coursework. Essential components of the program include the following:

- a highly diverse curriculum available on both campuses;
- original, supervised scholarly research, to be written up and formally defended as paper(s) and/or dissertation;
- efficiencies obtained by sharing the diversity of courses and research opportunities already offered at both campuses;
The well-established rules and guidelines of the Office of Graduate Studies (OGS), TAMU, regarding admission, advising, course requirements, examinations, and thesis and dissertation research, production, and defense will be followed. Students admitted to the OCNG JDP through the OUC campus will follow the well-established rules and guidelines for graduate education at TAMU.

The total estimated cost of the program during the first five years is . Of this, the majority of funding is required for student support and will come from scholarships provided by the Chinese Scholarship Fund. Tuition and fees will be covered by faculty at TAMU using grant money obtained from funding agencies. There are small additional requirements for travel to and from China for faculty from both institutions. No additional personnel are required for this program.
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Appendix A Memorandum of Agreement with OUC; Addendum to Supplement

Appendix B Participating Graduate Faculty from TAMU, with abbreviated resume and a list of courses to be offered

Appendix C Participating Graduate Faculty from OUC, with abbreviated resume and a list of courses to be offered

Appendix D State, local, federal and private entities where graduates have or are being employed
October 23, 2008

MEMORANDUM

To Whom it May Concern

SUBJECT: Joint PhD Program Between Texas A&M University and Ocean University, Qindao, China

FROM: Robert C. Webb

The Department of Oceanography at Texas A&M University (TAMU) and the Ocean University, Qindao, China (OUC) have recently signed a Memorandum of Understanding to establish a joint Ph.D. program in Oceanography and carry out joint research programs.

A number of students from OUC have previously obtained post-graduate degrees from TAMU. The Office of Graduate Studies is therefore pleased to support this new program, which will likely increase the number of high-quality students from OUC and lead to a deeper relationship between the two institutions.

I hope that the joint program will be a long-lasting success and lead to increased ties between Texas A&M and the Ocean University. It provides a model that can be used for similar joint programs between TAMU and other universities, both in China and elsewhere.
October 3, 2008

To whom it may concern:

Subject: Joint Ph.D. Program between Texas A&M University and Ocean University, Qingdao, China

The Department of Oceanography at Texas A&M University and the Ocean University, Qingdao, China have recently signed a Memorandum of Understanding to establish a joint Ph.D. program in Oceanography and to carry out joint research programs.

I am pleased to support this program, which is likely to increase the number and quality of students from Ocean University at Texas A&M, as well as increase research funding at the two institutions. To encourage research participation, the Office of the Vice President for Research has already provided seed money for an initial project between faculty at the two universities, and I anticipate that the results of this project will result in additional proposals.

I hope that the joint program will be a long-lasting success and lead to increased research ties between Texas A&M and the Ocean University.

Sincerely,

Theresa A. Maldonado

Dr. Theresa A. Maldonado
MEMORANDUM

To: To Whom It May Concern

From: Dr. Björn Kjerfve
       Dean, College of Geosciences

Subject: Joint Ph.D. Program, Texas A&M University
         and Ocean University of China, Qingdao

The Department of Oceanography within the College of Geosciences, and the Ocean University of China, Qingdao, signed a Memorandum of Understanding earlier this year to establish a joint Ph.D. program in the Department of Oceanography and to carry out joint research efforts.

This program has my full support. I also anticipate that the number of exemplary students from the Ocean University of China joining this program will increase in the future and that the research ties between the two institutions will continue.

It is a pleasure to be involved in a program such as this.
Letter of Support from President of OUC

October 15, 2008
Texas A&M University
College Station, Texas
United States of America

Dear Sir or Madam:

I am very pleased that both Ocean University of China and Texas A&M University have established strong friendly relations, thanks to years of cooperation and exchange between us. The fruitful exchange visits made by top leaders from both universities in recent years and the 2007 China-U.S. Forum on Higher Education held in Washington in October have pressed ahead with our friendly ties.

Since we have reached an agreement for our Joint Ph.D. Program when I visited the U.S. last year, I shall, on behalf of OUC, give my full support to the implementation of this cooperative program. I will also encourage all our related departments and offices here at OUC to contact your university so as to facilitate the smooth running of this program soon.

I firmly believe that the implementation of this program will exert a far-reaching and favorable influence on the development of our two universities.

Sincerely yours,

WU Dexing (Ph.D.)
President
Ocean University of China
Letter of Support from Vice President of OUC

October 15, 2008
Texas A&M University
College Station, Texas
United States of America

Dear Sir or Madam:

I am very pleased that both Ocean University of China and Texas A&M University have reached an agreement for our Joint Ph.D. Program during the 2007 China-U.S. Forum on Higher Education in Washington, thanks to years of friendly exchange and fruitful cooperation between us.

As the Vice President of OUC in charge of graduate education and international cooperation and exchange, I shall give my full support to the implementation of this cooperative program. I will also encourage all our related departments and offices here at OUC to contact and work together with your university so as to facilitate the smooth running of this program soon.

I am deeply convinced that we will make great achievements through our joint efforts in carrying out this joint program.

Sincerely yours,

[Signature]

DONG Shuanglin (Ph.D.)
Vice President
Ocean University of China
Letter of Support from Dean of Graduate School of OUC

October 15, 2008
Texas A&M University
College Station, Texas
United States of America

Dear Sir or Madam:

Thanks to the long-term fruitful cooperation and mutual understanding, both Ocean University of China and Texas A&M University have carried out the joint degree program for postgraduates in marine sciences through integration of advantageous resources from both of our universities in teaching and research. In addition, both of us have made great efforts in facilitating the establishment of our Joint Ph.D. Program. We firmly believe that this program will greatly benefit the young researchers who are enthusiastic about marine sciences, improve the academic capacity of postgraduate students and provide more opportunity for mutual exchanges between our two universities.

Graduate School of OUC will give full support by providing services in management, teaching and experimental resources so as to facilitate the smooth running of this program.

Sincerely yours

Cao Zhimin (Chief)
Dean of Graduate School
Ocean University of China
I. PROGRAM ADMINISTRATION

A. Describe how the program would be administered.

The program is a Ph.D. program, and will be administered and governed by an Administrative Council composed of the respective Deans, Deans of Graduate Studies and the Vice Presidents for Research of TAMU and OUC. The Administrative Council will meet annually by videoconference to ensure that adequate personnel and resources are available to the program.

The Joint Degree Oceanography Graduate Faculty (JDGF) will form a Faculty Executive Committee (FEC) composed of three members of the JDGF from each institution. The faculty representatives will be chosen by vote or by appointment by the respective Department Heads. JDGF on each campus will elect Co-Chairs. Co-Chairs will be responsible for managing the program on a day-to-day basis, but will be accountable to the Department Heads at the respective institutions (Fig. 1).

TAMU

OUC

Administrative Council

Dean of Geoscience
Dean of Oceanography
Dean of Graduate Studies
Dean of Graduate Studies
VP Research
VP Research

Faculty Executive Committee

3 members of TAMU OCNG Graduate Faculty
3 members of OUC Graduate Faculty

Head OCNG, TAMU

Figure 1

1. Indicate the name and title of person(s) who would be responsible for curriculum development and on-going review.

The Department Head at TAMU will have overall responsibility for the OCNG Joint Degree Program (JDP), but will rely heavily on the advice of his/her counterpart at OUC, the FEC and its elected co-chairs. The Department Head and FEC will report annually on all program activities, including budgetary requests, to the Administrative Council. The role of the Administrative Council is to ensure the OCNG JDP maintains the highest standards, aligns with the missions of both departments and universities, and abides by the rules and regulations of the respective institutions. Curriculum development is the specific duty of the curriculum committee of OCNG in consultation with their counterparts at OUC.
232 The FEC Co-Chairs must approve all degree plans and dissertations. The department heads of both institutions have overall signature authority.

2. Describe the responsibilities for student advisement and supervision.

237 The FEC Co-Chairs, assisted by the OCNG graduate advisor (OGA), will have overall supervisory authority for advising all graduate students in the program with respect to assisting in registration, thesis or dissertation deadlines, etc. Before the completion of the first 27 credit hours for the PhD degree, each student will select a Student Advisory Committee (SAC) consisting of no less than four members of the graduate faculty, including thesis co-chairs from each campus, and file a degree plan. The majority of the SAC must be composed of TAMU faculty and be members of the university graduate faculty. All members of the SAC will be approved via the process described in section F.2. The thesis co-chairs of the student's committee must have a graduate faculty appointment in the Oceanography departments of either campus and be a member of the JDGC and will have direct responsibility for supervising and advising the student with regard to academic and research topics. The FEC co-chairs and the OGA will work closely with individual SAC co-chairs to handle student needs.

258 The OGA will be responsible for student recruitment, record keeping, advising and registration, under the supervision of the OCNG Department Head. Additionally, the OGA will work closely with the FEC Co-Chairs on issues related to recruiting, registration, foreign national guidelines, travel and leave, adherence to TAMU Office of Graduate Studies (OGS) rules and procedures, benefits, fellowships and the assignment of teaching (GAT) and non-teaching assistantships (GANT), if applicable.

278 To ensure that faculty from both institutions are fully involved with the students, the TAMU co-chairs of each SAC will be responsible for inviting their Chinese counterparts to visit TAMU at least once during the studentship. All decisions on a student's research topic will be made jointly between the TAMU and OUC members of the SAC, and there will be regular reports on each student's progress to keep OUC personnel up to date.

3. If the program would be administered by more than one administrative unit, what factors would make this desirable?

284 As the OCNG JDP involves two universities in separate countries, TAMU has adopted a simple administrative structure for providing coordination between TAMU and OUC. The two College Deans, Deans of Graduate Studies and the Vice Presidents for Research will form the Administrative Council, who oversee and thus ensure the implementation and success of the program. The Department Head at TAMU will have overall responsibility for the OCNG JDP. The Faculty Executive Committee, who represent the faculty from each of the participating departments, and their elected Co-Chairs in residence at each of the two campuses, along with the Oceanography Graduate Advisor, will oversee daily operations.

297 Having joint control by both universities is desirable because of the need to provide input from both institutions to students participating in the program. Both institutions have a strong history of graduate education, but the emphasis differs between them. For example, while students at TAMU take general courses in all four oceanography disciplines, OUC students specialize more in the discipline of particular interest during their first year of
graduate study and therefore come with better grounding in certain areas. The FEC will
work to ensure that students entering the program complete the necessary courses of study
that will cover the field of oceanography adequately.

B. If a non-academic administrative unit, e.g. "institute" or "center" would be involved in
administering the program, describe the relationships.

No non-academic units will be involved in administering this program.

C. If a new organizational unit would be created, or an existing organizational entity
modified as a result of this program, identify and describe the anticipated result.

No new organizational units will be created or any existing organizational entity be modified
as a result of this program.

II. PROGRAM DESCRIPTION

A. Program Objectives

1. Describe the educational objectives of this program. (Include reference to preparation
of students for licensure or certification, if appropriate and any special outcomes or
competencies, which the program would provide, that are not available from existing
degree programs.)

The goal of the program is to promote faculty at the two institutes to work together to train
graduate doctoral students and enhance graduate education and research. The objective is to
educate high-quality students who wish to pursue oceanographic careers in research, higher
education, government, not-for-profit non-governmental organizations (NGO’s) or
industry. The program will ensure that highly qualified individuals will be sent into the job
market by providing a strong curriculum with in-depth course work and a rigorous program
of hands-on field and/or laboratory research.

Both universities presently have excellent programs in oceanography and provide graduate
degree (M.S. and Ph.D.) programs. TAMU was ranked in the top 10 universities in the last
national survey of oceanography programs in the U.S. (a new ranking list is expected later
this year), and has world-renowned researchers. As its name implies, OUC is the premier
university in China teaching oceanography. The combination will provide greater
intellectual input than either alone, as well as opportunities for students at TAMU to make
use of Chinese resources, such as ships. Since TAMU already has a Ph.D. program, this
collaboration is a means to increase the number of high-quality students available to OCNG
at a minimal cost to the department. We anticipate that this could become a model for
TAMU to collaborate similarly with other universities.

The Ph.D. degree is intended to attract students who are interested in teaching and
conducting independent research in academia, government or industry, or overseeing such
research. Students may enter the Ph.D. program directly if they have sufficient preparation,
or may enter with an M.S. in oceanography or a related discipline.

No license or certification is associated with this program.
2. If the program design includes multiple curricula (concentrations, emphases, options, specializations, tracks, etc.), describe the educational objectives of each (Each of these curricula must be identified on the title page, including the Texas CIP code).

This is a presently existing Ph.D. Program. No options are requested.

B. Admission Standards

1. State admission requirements for the program (if there are different categories for admission, e.g. unconditional, probationary, etc., describe each).

The requirements for admission to the OCNG JDP will be essentially the same as for admission to graduate studies at TAMU; that is, a student must:

a. Hold a four-year baccalaureate degree or higher from a college or university of recognized standing (i.e., a degree recognized as equivalent to a baccalaureate degree from an accredited institution in the U.S.), have a satisfactory overall transcript, and the student’s grade point ratio in the last 60 hours of coursework must be acceptable;

b. Show promise of intellectual and academic ability to pursue advanced study and research satisfactorily, through both scholastic evidence and a minimum of three letters of recommendation from persons capable of judging the applicant's capabilities, and an evaluation of the Statement of Purpose essay;

c. Have had adequate preparation to enter graduate study in the chosen field;

d. Have acceptable GRE or GMAT scores (evaluated in a manner that complies with House Bill 1641).

e. International students must achieve the status of English Proficiency Verified. Scoring at least 550 on the paper-based, or 213 on the computer-based, or 80 on the internet-based TOEFL exam, at least 400 on the GRE verbal exam, or at least 22 on the GMAT may accomplish this. International students must be English Proficiency Certified before they will be allowed to teach. Scoring at least 80 on each section of the English Language Proficiency Examination, or earning grades of A or B may accomplish this in English Language Institute courses (300 or higher level courses). Students who have graduated from an accredited U.S., New Zealand, Australian, UK or Canadian institution of higher learning will be granted automatic certification.

In order to account for the uniqueness of the program and ensure finding the best cohort of students, the OCNG JDP admission process will include exceptions to (d) and (e) above (see (4) below). Note that OCNG has previously accepted many graduate students from OUC, and the department is satisfied as to their general knowledge base. While not a requirement, it is anticipated that at least some students will have obtained an M.S. degree by the time they enroll in the program. If, however, after arrival students are felt not to be of a sufficient standard to satisfy the requirements for a Ph.D., they may transfer to a M.S. degree program.
The following selection strategy will be used each year and has the approval of the Dean of Graduate Studies:

1. OUC makes preliminary selection of 10 OUC students whose research interests fit within the area of collaborative research between TAMU and OUC faculty. These students will be in the first or second year of their graduate studies at OUC. The preliminary selection should be completed before October 15. (Note: because the students have to leave China in the same year as they are awarded a scholarship by the China Scholarship Council, any student considered for this program must already be registered for graduate studies with OUC.)

2. The application material of the selected candidates, including a brief research proposal, should be sent to TAMU by the end of October. TAMU carefully reviews all the applications and ranks top candidates by end of November.

3. A two- or three-member TAMU selection committee visits OUC in late November/early December. In partnership with the OUC selection committee, an interview will be conducted for all applicants in English. During the interview, each applicant will give a roughly 20-minute presentation based on the brief research proposal. Committee members will examine the applicants’ English proficiency, as well as their knowledge and skills in the proposed research area. Final candidates (probably five in number, although additional students may be accepted in special circumstances) will be selected after the interviews are completed. Selection will be made taking into account the interests of both the students and the faculty at TAMU.

4. Candidates may be accepted following the interview if the selection committee determines that the candidates’ English proficiency and background are satisfactory, but will be required to obtain an acceptable score on the TOEFL examination before admission to TAMU. These candidates will be issued admission offer letters by TAMU. It is also highly recommended that they take the GRE examination before they arrive, as this may make them eligible for financial aid. If they have not taken the GRE by the time they arrive in College Station, they will be required to take it during their first year at TAMU.

5. During the visit, the members of the TAMU selection committee will give seminars to OUC faculty and students, describing active areas of research at TAMU. Once the selection process is completed, the members will meet with OUC co-chairs to discuss dissertation topics and research directions.

6. TAMU will be responsible for the airline ticket from US to China and hotel expenses within that country. Other local expenses in China will be covered by OUC.

C. **Degree Requirements**

1. In tabular form, indicate the semester credit hours (SCH) requirements in each of the following categories applicable to the proposed degree programs; include the total SCH requirements for the degree:
<table>
<thead>
<tr>
<th>Credit Hours Required for</th>
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<tbody>
<tr>
<td>Doctor of Philosophy Degree</td>
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<td></td>
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<tr>
<td>With M.S.</td>
</tr>
<tr>
<td>Courses</td>
</tr>
<tr>
<td>Seminar</td>
</tr>
<tr>
<td>Research hours</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

a. Foundation (Leveling) Courses (0 credit hours to as many hours as needed).

Students entering the program will be expected to have a strong background in the physical and/or biological sciences, as well as a good foundation in mathematics. Students lacking preparation in a particular subject area, but who are otherwise well-qualified to enter the graduate program, will be required to take appropriate leveling course work in addition to that specified for the Ph.D. degree. These courses will not be credited as part of the degree plan. The FEC in consultation with the prospective committee chairs will decide upon the need for leveling courses.

b. Transfer of hours gained at OUC.

A student may transfer a maximum of 20 hours of coursework taken at OUC to TAMU as part of this program. Hours to be transferred must be graduate level courses, and the student must obtain a grade equivalent to “A” or “B.” Research hours may not be transferred.

c. Additional courses available to all students in the proposed program.

As with all graduate degrees at Texas A&M University, the academic program is tailored to the background and educational goals of each degree candidate in consultation with his or her student advisory committee, utilizing courses provided by the faculty (a list of courses currently available to the OCNG JDP is given below in section II.D). As with all TAMU degrees, final degree plan approval resides in the Office of Graduate Studies, but with recommendation from the department in consultation with the OUC co-chair of the SAC.

The curriculum of the OCNG JDP, while not specifying individual courses, nevertheless requires that all students will be required to demonstrate competence in, and understanding of, general principles of oceanography. Assessment of this body of knowledge on an individual-student basis will be through course work completed, the dissertation proposal, the preliminary examination, the written dissertation on the student’s original research, and the dissertation defense. The department heads of both institutions will review individual degree plans with the co-chairs of the SAC to ensure that the foundations discussed above are met by the coursework.

The relevant courses available at the two participating campuses are listed in section II.D below. Other courses may be substituted for one or more of the courses in the lists, if the student has previously completed upper division or graduate-level courses with content deemed adequate by the student’s SAC. The SAC will determine the courses in
each student’s degree plan in collaboration with the student. The total number of hours
for the degree sought must still be met.

d. Courses elected by the student.

For the Ph.D. degree

The students in consultation with their co-chairs and committee members will
choose all elective courses, except as prescribed below. These may include courses
offered by other departments at TAMU, depending on the student’s interest.

e. Prescribed courses

For the Ph.D. degree

OCNG 608 Physical Oceanography (3 hrs)
OCNG 620 Biological Oceanography (3 hrs)
OCNG 630 Geological Oceanography (3 hrs)
OCNG 640 Chemical Oceanography (3 hrs)
OCNG 681 Seminar (1 hour; must be taken twice for a total of 2 hrs)
OCNG 691 Research (total hours varies)

Since, as stated above, students at OUC typically take more specialized courses than
those at TAMU in their first year of graduate work, it is expected that students admitted
to the program may already have completed work that can substitute for one of the core
courses (608, 620, 630 and 640). A decision on whether to credit students will be made
by the individual student’s SAC; this may require a short written examination.

f. Other required courses

For the Ph.D. degree

Biological students: OCNG 625 Current Topics in Biological Oceanography (1
hour; must be taken twice for a total of 2 hrs), plus 3 of the following five courses:
OCNG 610 Ecological Modeling
OCNG 622 Benthic Ecology
OCNG 627 Continental Shelf
OCNG 650 Aquatic Microbial Ecology
OCNG 654 Plankton Ecology

Chemical Students: OCNG 641 Marine Chemistry

Geological Students: No additional requirements

Physical Students: Three of the following eight courses:
OCNG 609 Dynamical Oceanography
OCNG 611 Global Scale Oceanography
OCNG 612 Elements of Ocean Wave Theory
OCNG 614 Dynamics of Oceans and Atmospheres
OCNG 615 Numerical Modeling of Ocean Circulation I
OCNG 616 Numerical Modeling of Ocean Circulation II
OCNG 617 Theories of Ocean Circulation
OCNG 651 Meteorological Oceanography

Again, one or more of these courses may be omitted if the SAC believes that the student has sufficient grounding in a particular subject.

g. Residence

Students entering the program with a baccalaureate degree must spend four academic years in residence at TAMU. Students entering with a M.S. degree must spend at least 2 years in residence. Registration on-campus for 9 credit hours per long-term or registration in 691 totaling 9 credit hours in aggregate per long term shall satisfy the technical requirement for residency. The student’s committee co-chairs, along with the SAC, will be the ultimate arbiter of the amount of time to be spent working in the mentor’s facility or otherwise working closely with the mentor.

h. Student’s Advisory Committee (SAC)

The Committee will consist of at least four members, each of whom must have a graduate faculty appointment at TAMU or OUC. The Co-Chairs of the Committee, one from each institution, must be faculty members of the participating departments and also be formal members of the OCNG JDP. At least one member from TAMU must be from a different academic field. The majority of the graduate committee must be composed of TAMU faculty.

External Committee Members (committee members who are not employed at either TAMU or OUC, e.g., qualified scientists at other academic institutions, governmental agencies, or industries), may be authorized as Special Appointments to the Graduate Faculty if they have expertise beneficial to the guidance and/or completion of the student’s research. Such external members may not constitute one of the four required committee members, but shall be in addition to them. The OGS and TAMU must approve all external committee members before they may serve on a committee. Categories and requirements of graduate faculty members are described in the TAMU Graduate Catalog.

i. The Degree Plan

Students, in conjunction with their committee chairs and committee members, will choose courses in the degree plan. The limitations on certain courses are described in the TAMU Graduate Catalogs. A list of suggested courses is included in Section II.D below. Guidelines for the use of transfer and certain other courses in the Ph.D. program can be found in TAMU Graduate Catalog.

j. Time Limit

All degree requirements for the Ph.D. must be completed within 10 years of entering the degree program, in accordance with provisions contained in the TAMU Graduate Catalogue. Note: Although students will enter in annual cohorts, each student will progress at his or her individual rate, thus there is no specific requirement to graduate sooner or later other than the above.
k. Applications and Deadlines

All applications and deadlines for admission to the program will be as described in section B.1 above. Applications and deadlines related to examinations and graduation shall be in accordance with provisions of the OGS, TAMU, and OUC as agreed by the FEC.

l. Examinations

A preliminary examination, written and oral, is required, and shall be administered in accordance with the rules outlined in the Graduate Catalogues of the respective institution. It will be given no earlier than a date at which the student is within approximately 6 credit hours of completion of the formal course work on the degree plan, or no later than the end of the semester following completion of the formal course work on the degree plan. Eligibility requirements for the preliminary examination include having an approved degree plan on file for at least 90 days prior to the examination, having cumulative and degree plan GPAs of at least 3.0, and having completed all English language requirements. The written portion of the exam shall cover all fields of study included in the student’s degree plan. The written examinations must be completed and reported as satisfactory before the oral portion of the examination may be held. On successful completion of the preliminary examination (written and oral portions), all ‘graded coursework on the degree plan with the exception of any remaining 681, 684, 690 and 691, residency requirements met, and submission of an approved dissertation proposal, the student will be admitted to candidacy.

Students enrolled through TAMU must pass the final examination/dissertation defense by deadline dates published in the TAMU OGS calendar. No student may be given a final examination unless their GPA is 3.0 or above, they have been admitted to candidacy, and there are no grades of D, F or U for any course listed on the degree plan.

2. Identify and describe special requirements for the program, e.g. clinicals, field experience, internships, practicum, thesis, etc.

The Ph.D. student will be conducting dissertation research primarily at TAMU. The Ph.D. dissertation will be completed in English and must be approved by his/her graduate committee. The final dissertation defense will be conducted at OUC in English with the presence of the co-chairs and an examining committee. The examination may incorporate TTVN or other closed-circuit remote transmission from OUC to TAMU to ensure participation by all OCNG members of the SAC.

The Ph.D. dissertation is required and shall demonstrate the ability to perform independent research. The dissertation must be the original work of the candidate.

No specific internships are required, although individual faculty mentors may recommend an internship as a means of expanding the student’s knowledge and understanding of his or her chosen field. Participation in research cruises may be required, depending on the student’s chosen research field, although all students are encouraged to take part in cruises if possible.
D. Curriculum

1. Identify by prefix, number, title, and description (including prerequisites) courses to be required or elected in the proposed program. Identify with an asterisk (*) courses added during the last three academic years, and with two asterisks (**) courses to be added if the program is authorized.

A committee will be established by the Administrative Council to confirm that courses offered by both institutions are of a comparable and acceptable standard. This committee will also evaluate any new courses that may be proposed by faculty at either institution. Current courses offered at each institution are listed below.

TAMU Oceanography
(OCNG)

604. Ocean Observing Systems. Credit 3. Investigate the rationale behind ocean observing systems; familiarize students with the relevant social, scientific design, technology, and policy issues associated with observing systems. Prerequisite: Approval of instructor.

608. Physical Oceanography. (3-2) Credit 4. Observations, instruments; physical properties of seawater; property distributions; characteristics of water masses; heat budget; kinematics; gravity, pressure, hydrostatics, stability; horizontal flow; Coriolis force, geostrophy; friction, wind drift; general circulation; wave motions; tides. Prerequisite: MATH 172 or equivalent; PHYS 219.

609. Dynamical Oceanography. (3-0) Credit 3. Systematic treatment of the kinematics, dynamics and thermodynamics of the ocean; integral conservation relations; solenoidal versus conservative vector fields; potential vorticity; geostrophic adjustment; inertial and buoyancy modes; Bernoulli-Montgomery potential; energetics in a rotating system; available potential energy; natural temporal and spatial scales. Prerequisites: OCNG 608 or ATMO 435; MATH 601.

610. Mathematical Modeling of Marine Ecosystems. (3-2). Credit 3. Theory and technique of model development for marine ecosystems; mathematical representation of interactions among nutrients, phytoplankton, zooplankton, fish and the physical environment; scrutiny of biological concepts and mathematical structure of existing models; laboratory segment to focus on computational techniques applicable to classroom problems. Prerequisites: OCNG 608 and 620, calculus or approval of instructor.

611. Global Scale Oceanography. (3-0) Credit 3. A balanced description of the ocean's large-scale circulation and water mass structure based on the interpretation of modern observations, with emphasis on the ocean's role in global climate, and physical-chemical property fluxes in basin to global scale budgets.

612. Elements of Ocean Wave Theory. (3-0) Credit 3. Theories of simple harmonic surface gravity, capillary and internal waves. Wave propagation, dispersion and energy; modifications due to rotation, variable depth and finite amplitude. Prerequisites: OCNG 608 and MATH 601 or approval of instructor.

614. Dynamics of the Ocean and Atmosphere. (3-0) Credit 3. Time-dependent motions in rotating, stratified fluids, with application to the ocean; Boussinesq and betaplane approximations; circulation, vorticity and energy conservation; Kelvin, Poincaré and Rossby waves; tidal forcing and response; quasi-geostrophic potential vorticity; concepts of barotropic and baroclinic instability.

615. Numerical Modeling of Ocean Circulation I. (3-2) Credit 3. Mathematical theory and numerical technique of model development for ocean circulation; concepts of numerical consistency and stability; Lax equivalence theorem; commonly used finite difference schemes in ocean modeling; finite element and spectral methods as alternative means of discretisation; positivity and CFT method; relaxation and direct methods for solving elliptic equations. Prerequisite: OCNG 608.
616. Numerical Modeling of Ocean Circulation II. (3-2) Credit 3. Quasigeostrophic ocean
circulation models; Arakawa’s energy and enstrophy conserving scheme; spectral barotropic
vorticity model on sphere; shallow water primitive equation models; geostrophic adjustment on
different numerical grids; boundary conditions in numerical models; introduction to ocean general
circulation models; mixed models and sub-gridscale parameterization; oceanic data assimilation.
Prerequisite: OCNG 615.

617. Theories of Ocean Circulation. (3-0) Credit 3. Theories of wind-driven circulation,
Sverdrup solution, frictional and inertial boundary regimes; instabilities, meanders and mesoscale
features; role of stratification, topography and time dependence; Thermohaline circulation.
Prerequisite: Graduate classification.

620. Biological Oceanography. (3-0) Credit 3. Critical analysis of contribution of biological
science to our understanding of sea; discernible interrelationships between organisms and
physiochemical parameters. Prerequisites: General prerequisites for oceanography.

622. Analysis of Benthic Communities. (2-3) Credit 3. Comprehensive study of marine benthos
with principal emphasis upon Gulf of Mexico and Caribbean Sea. Prerequisite: OCNG 620 or
equivalent.

625. Current Topics in Biological Oceanography. (1-0) Credit 1. Areas of current research;
plankton processes; microbial food web; benthic communities; fisheries; global change. May be
taken up to three times. Prerequisite: OCNG 620 or approval of instructor.

627. Ecology of the Continental Shelf. (3-0). Credit 3. Environments, populations and
communities of the continental shelf. Interactions of the shelf with the estuaries and the deep sea;
man’s impact on the shelf ecosystems. Prerequisites: Approval of instructor.

629. Lower Food-web Dynamics of Aquatic Ecosystems. (2-3). Credit 3. Dynamics of the lower
food web in estuaries, rivers and lakes, detailing the role and interactions between biota and how
they are influenced by abiotic processes; effect of man’s activities on natural succession patterns
and ecosystem productivity, elucidating the potential for new management practices. Prerequisite:
Graduate classification. Cross listed with WFSC 629.

630. Geological Oceanography. (3-0). Credit 3. Survey of marine geology, structure and
composition of ocean basins and continental margins, properties or marine sediments.
Prerequisites: General prerequisites for oceanography.

632. Sea Level Change (3-0) Credit 3. Modern sea level; topography, measurement, meteorologic
and oceanographic contributions, periodic and non-periodic changes; long-term changes:
determination, Cenozoic history, Quaternary glacial-interglacial fluctuations; changes during the
past century and decade; observations, natural and anthropogenic influences; estimates of future
changes and societal implications. Prerequisite: Graduate classification; approval of instructor.

640. Chemical Oceanography (3-0). Credit 3. Chemical composition and properties of seawater,
evaluation of salinity, pH, excess base and carbon dioxide in the sea. Marine nutrients, oxygen and
other dissolved gases, organic constituents. Prerequisites: General prerequisites for oceanography.

641. Marine Chemistry. (3-0) Credit 3. The physical/inorganic chemical properties of seawater
and its interactions with marine minerals; major topics: thermochemical properties of seawater,
equilibrium and kinetic processes controlling ion speciation; geochemical processes at mineral
surfaces; kinetics of mineral-seawater interactions; applications to modeling early diagenesis.
Prerequisite: OCNG 640 and/or GEOL 640.

642. Marine Biochemistry Lab. (0-2) Credit 1. Laboratory exercises including analyses of
salinity, oxygen, nutrients, carbon dioxide system, organics; focus on both dissolved and solid
phases; measurements of phytoplankton biomass, productivity, growth and mortality;
determination of water column and benthic biomass and respiration; microbial biomarkers;
overview of field instrumentation. Prerequisites: General prerequisites for oceanography; graduate
classification.

644. Isotope Geochemistry. (3-0). Credits 3. Stable and radioactive isotope variations in natural
materials; applications to geochronometric, geothermometric and paleoclimatologic studies of the
marine environment. Prerequisite: Approval of instructor.

compounds in contemporary marine environments and in recent and ancient sediments. Specific
analytical techniques. Prerequisite: Approval of instructor.

646. Dynamics of Colloids in the Environment. (3-0). Credit 3. This course is a description of
the equilibrium and dynamic aspects of the physics and chemistry of such colloidal particles and
macromolecules and the implications for environmental systems, relevant for organic carbon flux and cycling, fate and transport of pollutants, bioavailability of pollutants, or mobility of pollutants in groundwater. Prerequisites: Physical Chemistry, Thermodynamics, Aquatic and Organic Chemistry.

647. Chemical Contamination of the Marine Environment. (3-0) Credit 3. Assessment of the inputs, transfers, effects and fates of heavy metals, radio-nuclides, petroleum hydrocarbons, chlorinated hydrocarbons and other chemicals in the ocean; models developed to predict the future viability of the ocean with particular emphasis on the Gulf of Mexico. Prerequisite: Approval of instructor.

649. Estuarine Biogeochemistry. (3-0) Credit 3. Geomorphology; physical oceanography and sedimentation dynamics of estuaries; chemistry of nutrients; trace metals and organic matter; major controls in estuarine productivity and interactions among estuaries, marshes and coastal waters. Prerequisites: OCNG 620 and 640.

650. Aquatic Microbial Ecology. (3-0) Credit 3. Microbes in natural environments, including both water and sediment habitats in marine, fresh and ground water systems; process studies of microbial food webs and biogeochemical cycling; current methods and research directions. Prerequisites: OCNG 620 and WFSC 414 or approval of instructor. Cross listed with WFSC 650.

651. Meteorological Oceanography. (3-0) Credit 3. Interaction between the ocean and atmosphere; major features of the two systems; heat budget, teleconnections between ocean and atmosphere, El Niño and related phenomena. Prerequisite: OCNG 608.

652. Sedimentary Biogeochemistry. (3-2). Credit 4. Focus on benthic processes occurring near the sediment-water interface of marine sediments; interdisciplinary approach in examining complex interrelationships among organisms, pore waters and sedimentary minerals in different marine environments; laboratory methods taught and applied to field case studies in different marine environments. Prerequisites: OCNG 620 and 640 or approval of instructor.

654. Plankton Ecology. (2-2). Credit 3. Elective course, overview of phytoplankton and zooplankton; taxonomy; physiology; ecology; sampling design; current methods of investigation. Prerequisites: OCNG 620.

660. Implementing Marine Ecosystem Models. (3-0). Credit 3. Examination of examples of implementations of models of marine ecosystems in the most influential papers; students expected to code the simpler examples and analyze them; review of important nutrient-phytoplankton-zooplankton (NPZ) models as well as other approaches to studying aquatic ecosystems. Prerequisites: approval of instructor.

662. Coastal and Marine Sedimentary Processes. (3-2). Credit 4. Sedimentary processes (erosion, transport and deposition) from the coastline to the deep sea; development of estuaries, deltas, continental shelves, submarine canyons, fans; behavior of fluids and particles in boundary layers. Lab: recirculation flume, field and lab instrumentation. Prerequisite: Approval of instructor.

663. Particle Dynamics and Fluxes. (3-0) Credit 3. Particle dynamics and processes from the sea surface to the seafloor; global distribution, dynamics and fluxes of particles from microns to millimeters (marine snow); results from sediment traps, optical sensors, particle counters applied to biogeochemical cycles in the ocean. Prerequisite: Approval of instructor.

668. Geology and Geophysics of Small Ocean Basins. (3-0) Credit 3. Geology and geophysics of the Gulf of Mexico, Caribbean, Mediterranean, Arctic Ocean, Red Sea and Philippine Sea; the regional geology, sediment distribution, general structure and origin of each basin. Prerequisite: OCNG 630.

673. High-Resolution Marine Geophysics. (2-2). Credit 3. Introductory course on the geophysical nature of the seafloor and marine subbottom to 1.5 seconds two-way travel time; generation, use and interpretation of reflection and side-scan sonar records and magnetic anomalies of various marine environments and seafloor features. Prerequisite: Approval of instructor.

674. Paleoclimatology. (3-0). Credit 3. History of oceans through the geologic time; marine paleontological, geochemical, sedimentological and geophysical evidence; inferred changes in seawater properties, ocean circulation and sea level; relation to climate, tectonic processes, atmospheric chemistry and evolution of life. Prerequisite: OCNG 630 or approval of instructor.

675. Environmental Management System Strategies for the Scientist. (3-0) Credit 3. Provide students with EMS strategy skills: environmental laws that may be triggered by activities; fundamental structure of an EMS; EMS alternatives; concepts in an audit; alternative dispute
resolution; how effectively EMS can reduce costs and increase profits. Prerequisite: approval on
instructor. Cross listed with MARS 675 at Texas A&M University at Galveston.

676. Marine Environmental Policy: A Survey. (3.0). Credit 3. Basic concepts and mechanisms
of international and US federal environmental law and policy; survey of the field and focus on case
studies illustrating basic types of environmental problems. Prerequisite: approval of instructor.

Cross listed with MARS 675 at Texas A&M University at Galveston.

677. Oceanographic Data Collection and Analysis Methods* (3-0). Credit 3. Applications of
data collection strategies, numerical methods, the actual mechanics of oceanographic data
analyses, and interpretation of the results (i.e., hypothesis testing). Primary emphasis on common
techniques and approaches used in collection and analysis of oceanographic data. Prerequisite:
graduate standing.

681. Seminar. (1-0). Credit 1. Presented by faculty, students, staff and visiting scientists; based
on recent scientific research.

Ocean University, China

backgrounds of Ocean dynamic process. Ocean wave theory. Wind driven ocean circulation
theory. Introduction of thermalhaline theory.

OUC 2. Marine Biogeochemistry. Credit 2. This course is provided by learning-active teaching
and discussion. Focus on: hypoxia and its effects in the sea; greenhouse gases and climate change;
sea-air interaction; nutrient elements in coastal ecosystems; nutrient elements in China Seas;
biogeochemical cycle of silicon; exchange between sediment and sea water interface; application
of the radioactive and stable isotopes; marine pollution.

OUC 3. Dynamical Meteorology. Credit 3. Dynamic meteorology is the study of those motions
of the atmosphere that are associated with weather and climate. The science of dynamic
meteorology continues its rapid advance, and its scope has broadened considerably. This course
will familiarize you with basic concepts of dynamic meteorology and will help you to better
understand the rich variety of geophysical phenomena ranging from convective to planetary scales.
This is the basic text for the course and the standard book in the field.

OUC 4. Introduction to Environmental Science. Credit 2. This comprehensive course gives
introduction to the structure and functions of ecosystems, atmospheric, water and soil pollution,
methodology for environmental quality assessment and environmental monitoring. It provides
basic concepts of food-web and ecosystem, sustainable development, chemical pollution and
human health risks. It also provides ideas of environmental management for persistent organic
pollutants.

OUC 5. Marine Biology. Credit 2. This course deals mainly with marine microorganisms, marine
micro- and macro-algae, and the major taxonomical groups in invertebrates and vertebrates. The
biology, morphology, anatomy, the life cycle of representative species of each kingdom, the
ecology and the systematic biology will be introduced. The potential the actual use in aquaculture
of some economically important species will also be provided.

OUC 6. Waves in the Ocean. Credit 2. General properties of waves; surface gravity, capillary,
inertia-gravity, internal, Kelvin, Rossby, Poincare waves; Laplace tidal equations and the vertical
structure equation; Equatorial beta-plane and equatorial waves; Stratified quasi-geophysical motion
and instability waves; Wave-mean flow interaction.

OUC 7. Physical Oceanography. Credit 2. Introduction to physical property of seawater,
distribution of water characteristics in the oceans, heat and salt budgets, large-scale circulation and
water masses, measurement, coastal oceanography and air-sea interaction.
OUC 8. Geophysical Fluid Dynamics. Credit 3. This course is an introduction to fluid mechanics with special attention paid to concepts and applications that are important in oceanography and meteorology. Indeed, both meteorology and oceanography are notable for the fact that the explanation of fundamental phenomena requires a deep understanding of fluid mechanics in circumvolve coordinate. Earth’s atmosphere and oceans exhibit complex patterns of fluid motion over a vast range of space and time scales. Geophysical Fluid Dynamics (GFD) is the science of all these types of the fluid motion, but this course we have to put attention on the large scale motion. It seeks to identify and analyze the essential dynamical processes that lie behind observed phenomena about the larger scale dynamic process. As with any other theoretical science of complex nonlinear dynamics, mathematical analysis and computational modeling are essential research methodologies.

OUC 9. Estuary Sediment Dynamics. Credit 2. This course presents an introduction to the hydrodynamic-associated sediment transport processes within the estuarine systems. It primarily includes: tidal mixing and stratification of water column; buoyancy-driven plumes and gravity-driven hyperpycnal flows off the estuaries; formation of estuarine turbidity maximum (ETM) and its implication to estuarine geomorphology; front systems in the estuaries and their impacts on sediment transport; mechanics of sediment settling and resuspension; basic equations that describe the physical processes of sediment transport. This course will provide a general view of sediment transport in estuaries and the related dynamical processes to the students with interests in geological oceanography.

OUC 10. Regional oceanography. Credit 2. This course is an introduction to the oceanography for some typical coastal regions like shelf sea and estuaries. It includes: the European continental shelf sea hydrology, oceanography of Arctic shelf, upwelling off California coast, South Africa coastal current, hydrology of the East China Sea, oceanology in the Main Bay and Chesapeake Bay, sediment transport adjacent to the Changjiang and Yellow River. Purpose of this course is to learn how the geography and topography make the characters in different regions and how the climate change and human activities impact on its variation. 4 discussions and one project should be completed and an oral report should be made finally.

OUC 11. Climate Changes. Credit 2. This comprehensive course concentrates on the phenomena and processes of climate change on global and regional scale on the aspects of ENSO, Monsoon and so son. Some special weather phenomena such as sea fog, meso-scale cyclones in the eastern Asian region and some key scientific questions in the domain of IGBP, especially related to marine ecosystem will be introduced. This course includes a group of presentations from different professors.

OUC 12. Marine Chemistry. Credit 3. This course is the basic course of marine chemistry. It focuses on basic chemical reaction and process in ocean. The content includes: 1) descriptive chemical oceanography, 2) composition of the major components of seawater, 3) minor components of seawater, 4) ionic interaction in seawater, 5) atmospheric chemistry, 6) dissolved gases other than CO2, 7) the carbonate system in seawater, 8) micronutrients in the oceans, 9) primary production in the oceans, 10) organic matter in seawater.

OUC 13. Physics of air-sea boundary layer. Credit 3. This course will introduce the physics of boundary layer near air-sea interface, including atmospheric boundary layer, marine boundary layer and the transfer processes between them. The turbulence, air-sea transfer, boundary-layer structure and dynamics, and boundary layer model are discussed extensively. It will focus on physical interpretation other than mathematical description. The effect of wind waves on the air-sea boundary processes is also emphasized in this course.

OUC 14. Introduction to Submarine Exploration Methodology. Credit 2. Introduction to sea bottom measurement technology (echo-sounder, side-scan sonar systems and multi-beam Sonar system), submarine sampling methods, and sediment analyses methods. This module provides: 1) the outline of survey methods of the submarine exploration; 2) grained size analysis method; 3) X-ray powder diffraction method; 4) Basic geochemical analyses method.
**OUC 15. Marine Geology. Credit 2.** Introduction to the concepts of ocean basins; overview of marine environment; the roles of mid-ocean ridges; structure and geological processes at continental margins; sedimentary processes within the marine; and resources in the Marine Realm, etc. A week cruise practical.

**OUC 16. Analytical Chemistry of Seawater. Credit 2.** The course includes the brief introduction and the sampling and pretreatment methods, and the determination of normal parameters of marine chemistry, such as salinity, chlorinity, dissolved oxygen, pH, total alkalinity, CO2 system and nutrients, dissolved and particulate organic carbon and some parameters of pollutant such as COD and trace metal as well. Purification of water and reagents, clean room technique, instrumental technology, data processing and analysis, and quality control are also involved.

2. If the program design includes multiple curricula (concentrations, emphases, options, specializations, tracks, etc.), identify courses unique to each alternative.

Multiple curricula are not planned.

3. Provide a semester-by-semester projection for offering of the required and prescribed courses during the first 5 years

Frequency of course offerings for the first five years of the program at TAMU. * = course added within the past 3 years. Those courses left blank are offered on the basis of demand.

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<td></td>
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<td></td>
</tr>
<tr>
<td>OCNG 675</td>
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<td></td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>OCNG 676</td>
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<td>OCNG 677</td>
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<td></td>
<td></td>
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<tr>
<td>OCNG 689</td>
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<td>OCNG 690</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>OCNG 691</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Note: The frequency of course offerings may vary, depending on demand, from semester to semester. Those left blank are offered on no set schedule, but remain available to all OCNG JDP students on the campuses where they are taught.

Frequency of course offerings for the first five years of the program at OUC.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Fall</td>
<td>Fall</td>
<td>Fall</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Spring</td>
<td>Spring</td>
<td>Spring</td>
</tr>
</tbody>
</table>

4. Describe arrangements that would serve nontraditional students, e.g., nontraditionally scheduled classes, delivery of instruction by telecommunications and/or off-campus instruction sites, library services, student advisement, etc., if applicable.
The OUC library facilities are able to serve currently only students in residence. The chair of the student’s committee could provide guidance for distance education via e-mail and telephone. The advising will be done by direct contact or discussion between the student and the supervisors.

Nontraditional students are able to utilize all the library resources of OUC via the campus internet system. The staff of Reference Department will provide guidance via e-mail and telephone.

The College Station library facilities are able to serve both distance and residence students; use of the World Wide Web enables students to access many holdings from anywhere in the world. The chair of the student’s committee will provide day-to-day guidance for distance education via e-mail and telephone. Additionally, OCNG is equipped with a TTVN system for delivering courses at a distance should this be necessary (e.g., for students resident in Galveston; a second such system is in the College Station library). The OGC on each campus will provide assistance on matters of deadlines, submission of degree plans, proposals, etc.

5. If the general education/core curriculum component of the proposed program differs from that required for all or most other undergraduate programs at the institution, indicate how and why.

This does not apply to the proposed graduate program.

E. Supporting Fields.

1. Identify existing programs and support areas in your institution, which would complement this program; describe the relationship of each to the proposed program.

The OCNG JDP will draw upon the expertise of faculty in the departments of Biology (BIOL), Chemistry (CHEM), Mathematics (MATH), Ocean Engineering (OCEN), Physics (PHYS) and Wildlife and Fisheries Sciences (WFSC) at TAMU, and the departments of Marine Biology (MARB) and Marine Sciences (MARS) at TAMUG. Some faculty in MARS and MARB and one faculty member in WFSC already have graduate appointments in OCNG in College Station and have both taught graduate courses and mentored Ph.D. students. Many of the proposed OCNG JDP faculty members also serve as external members of committees from other institutions, both within and outside the United States.

A variety of research programs are well established on the College Station campus that will complement this proposed interdisciplinary program, depending on student interests. Among the largest are the IODP, the GERG, and the Offshore Technology Research Center (OTRC). The Texas office of the National Sea Grant College Program, located in College Station, supports marine research, education and outreach along the state’s coastal zone that usually involves graduate students.
2. If the existing programs or supporting fields would require updating or expansion because of the new program, explain how and why.

Existing programs and supporting fields require no expansion. Since it is the nature of science to be in a constant state of flux, new courses will be offered as new information is acquired and assimilated, and major revision of existing courses will occur as the Program matures. The courses proposed for the degree program include those currently on the rosters of the respective participating departments, but should allow additional courses, including those listed but not currently offered and new courses, to be taught. As stated above, any new courses will be evaluated by both institutions before incorporation into the program.

F. Effect on Existing Programs.

1. Describe how existing courses would be affected by enrollment generated in the proposed program, including but not limited to, the potential need for additional sections or increased class sizes, faculty, library resources, equipment, supplies, and/or space.

Existing courses in the participating departments will see some increase in class size on the College Station campus, but this is unlikely to require additional sections of specialized graduate courses. As stated above, the influx of new students will likely allow courses to "make" more frequently than at present. Because of the diversity of the participating graduate faculty, the FEC, working with the curriculum committee of OCNG, will be able to schedule course offerings to meet the needs of the students and minimize the impact on programs with teaching loads that are already above average. Any new faculty members will, as a matter of course, introduce new courses and may be required to assist with teaching to meet the demands on each of the participating entities.

The Evans Library has numerous holdings in the field of oceanography and additional acquisition of material is not expected. Students enrolled in the OCNG JDP would have access to the library resources on each campus.

No new courses or facilities are required at OUC and there is adequate space at both campuses to support the new program.

The proposed program is not expected to have any negative impact on existing courses. Instead, the program will allow a greater variety of classes to be offered in College Station. Furthermore, there is the opportunity for some TAMU students to take courses at OUC on a reciprocal basis, enriching the existing programs with new electives. Collaboration with OUC will also have the added benefit of providing TAMU students and faculty increased access to ship-time and research opportunities in Chinese waters.

2. For a graduate program, describe how related undergraduate programs would be affected by enrollment in the proposed program, including changes anticipated in the rank and/or credentials of faculty teaching in the undergraduate program, and use of GATs, Graduate Assistants, Assistant Instructors, etc., and their credentials. Provide evidence that faculty (full-time, part-time or TA’s) in the proposed program, or who would replace current faculty reassigned to the proposed program, would meet SACS minimum standards for credentials and experience.
The current faculties in OCNG teach, and have taught a mix of both graduate and undergraduate courses for many years and this is not expected to change. Since, however, there is no Oceanography major in OCNG, the effect of the new program on undergraduate teaching is expected to be minimal.

All full-time faculty within OCNG hold the Ph.D. degree and meet the standards of the SACS. All faculty teaching graduate courses will be members of the graduate faculty. The only classes taught by GATs are laboratory sections; these teaching activities have always been under the direct supervision of a faculty member and this will not change.

All OUC full-time faculty members included in this program are expected to:

1. Be qualified to provide graduate supervision.
2. Be a full-time member of OUC graduate faculty.
3. Hold an earned Ph. D degree.

Note, however, that as regards item (3), many of the older faculty at Chinese universities were affected by the Cultural Revolution, which prevented them from gaining a Ph.D. There were, in fact, no graduate programs in Oceanography in China before 1980. While not all faculty in China are qualified to teach graduate students, all those members of OUC who are involved in the program are qualified for graduate teaching and supervision. As the program matures, and the older members of the OUC faculty retire, this problem will resolve itself; younger faculty are now being hired who have graduate degrees from the U.S. or other countries, and they are becoming better-known in the U.S. as they publish more in European and American journals.

All faculty members who wish to take part in this program will be accredited by a committee, drawn from both universities, to be established by the Administrative Council. The Council may use the FEC for this purpose. This includes new faculty hired after the program’s inception.

G. Accreditation.

1. If there is a professional program procedure in this field, attach current standards.

There is no professional program accreditation for the proposed degree.

2. State intention regarding accreditation.

There is no specialized disciplinary accreditation for Oceanography. The University is accredited through the Southern Association of Colleges and Schools and it is anticipated that the program will be assessed in the same way as current courses within OCNG on an ongoing basis. The only change to the present program is the acceptance of courses taught at OUC. These will be evaluated in the same way as courses currently submitted by students from outside the U.S. who enroll for the Ph.D. program at TAMU. As stated above, several students from OUC have been enrolled in graduate studies at TAMU previously, so we are familiar with the standards that they have maintained.
III. EVALUATION AND ASSESSMENT

A. Describe planned procedures for evaluation of this program and its effectiveness in the first five years of the program, including admission and retention rates, program outcomes, assessments, placement of graduates, changes of job market need/demand, ex-student/graduate survey, or other procedures. How would evaluations be carried out?

TAMU initiated a Doctoral Program Review protocol several years ago. These reviews are conducted by a select group of well-known academicians and administrators from prestigious institutions as well as industry leaders. The reviews are undertaken on campus over a three or four day period. Prior to the reviews, extensive documentation, collected through a department self-study, is provided to the review team. The data include faculty CVs, teaching loads, budgets, extramural funding, faculty publications, graduate student qualifications, student time-in-residence, student retention, and student employment after graduation, among others. The reviewers supply to the dean or vice president an in-depth evaluation of the program in question, including suggestions for program improvement. The TAMU Oceanography Department was last reviewed in May 2008, and the review panel was excited by the prospect of this new joint program. The next review will likely be in about seven or eight years time.

Two additional foci within the self-study and review are how the department’s plans relate to the University’s Strategic Plan, Vision 2020, and the measurement of specific student learning outcomes. The former addresses progress towards TAMU Vision 2020 goals of strengthening graduate programs, enhancing the graduate academic experience, diversifying and globalizing, and increasing access to knowledge resources (research and technology). The latter have been developed by faculty, emphasizing TAMU’s commitment to research, technology, diversity, and internationalization as defined by the University’s original Quality Enhancement Plan (QEP). Annual documentation of whether the department has achieved its goals is a requirement of the TAMU institutional assessment process.

For the determination of learning outcomes, the goals of the OCNG Ph.D. program are defined as:

- To equip students for work in ocean sciences;
- To teach advanced concepts in this field;
- To enable students to write and explain complex ideas;
- To enable students to collect, analyze, and interpret data sets using state-of-the-art methods;
- To empower students to plan and carry out independent scientific research in oceanography; and
- To enable students to evaluate current research in oceanography.

This means that students must be able to show their competence in collecting, analyzing and interpreting data (including model results); explain complex ideas orally and in writing; think critically about research topics; and obtain good positions once they have left TAMU. An additional requirement is to increase the diversity of the graduate pool within the university. Both direct and indirect methods will be used to determine how well students (and the program) are meeting these requirements. Direct measures will include:

- Faculty assessment of student qualifying exams
- Internship evaluations
- Development and assessment of the dissertation
- Submission of papers to journals
- Presentation of talks at department and national meetings
• Demonstration of appropriate use of technology related to oceanography curriculum

Indirect measures will include:

• Student interviews upon completion of degree requirements
• Graduate surveys at minimum 2 and 5 years post graduation
• Development of a departmental database to track graduates
• Employer surveys

The graduate program will also be evaluated on an on-going basis by the OCNG JDP faculty at least annually and will be documented in Texas A&M University’s institutional effectiveness process. Our Chinese partners will also be evaluating the effectiveness of the program from their perspective. In addition, the Administrative Council will monitor admission, retention, and academic progress. Students will be interviewed upon completion of degree requirements to determine their future plans and how they perceive the program’s effectiveness. Further, many of the OCNG JDP faculty members have maintained contact with their former graduate students to inform them of potential jobs, monitor their employment, and learn if any changes in the degree program need to be effected. This informal system will be formalized with a program in which former students are contacted at two and five years post-graduation to determine what benefits they received from the degree, what suggestions they can make for further improvements in the program and to update their employment history since graduating.

The findings of these assessments will provide information on the effectiveness of the program and how best to improve it, and what revisions, if any, are needed in terms of resources.

IV. PROGRAM NEED/DEMAND

A. Identify similar programs.

To our knowledge, there are no similar joint programs between universities, either within the U.S. or within China.

1. At Texas public and independent universities.

There are currently two programs in Texas offering Ph.D. degrees in Oceanography, at TAMU and the University of Texas. Both have been in existence for many years, but the proposed degree will be the only joint Ph.D. Oceanography degree between the U.S. and China within the state.

2. At out-of-state universities.

There are many additional institutions within the U.S. that offer Ph.D. degrees in Oceanography. Among others, we list the University of Maine, Massachusetts Institute of Technology/Woods Hole Oceanographic Institution, the University of North Carolina, University of Miami, University of South Florida, Florida State University, University of Southern Mississippi, Louisiana State University, University of California in San Diego, University of California in Santa Barbara, Oregon State University, University of Washington, University of Alaska, University of Hawaii. However, to our knowledge no other universities within the U.S. offer a joint Ph.D. degree in OCNG as proposed here.
B. Describe justification for the proposed program in terms of the following, as applicable:

1. Local, regional, national, and international needs (as appropriate).

The ocean is intimately concerned with global climate variability. With the growing interest in this field, it is becoming more important to study how the ocean changes on both time and space scales. Similarly, there is a need to provide protein from fish for the world’s population and simultaneously protect the environment from anthropogenic pollution. These factors have ramifications at local, regional, national and international levels. The proposed program will provide trained personnel who can work to alleviate problems in these fields, both around the U.S. coast and in China, where pollution resulting from the continued economic growth of the country is causing strains on the environment. Additionally, training the next generation of teachers who can help raise the visibility of climate change and environmental degradation is important in ensuring that the coastal regions remain habitable. Finally, the close ties developed by the students from China with professors and other students at TAMU will address the theme of globalization and help with future interaction between the two countries at all levels, including intergovernmental links.

2. The long-range academic plan of the institution.

The strategic plan of Texas A&M University was developed in the well-known Vision 2020 process. This program will address specifically two imperatives, which have been at the core of the University’s recent efforts to reach top 10 status within the public university fold:

- Improve graduate programs (Imperative 2)
- Diversity and globalization (Imperative 6)

3. Demand from prospective students.

Demand from within China has been good. The initial invitation for students to apply to this program was made in late 2007. 47 students responded and their applications were filtered through the administration within OUC. Ten students were interviewed in January 2008; all were found to have a good command of English and to be able to answer questions on their presentations (in fact, it is thought that students entrained through this program will be better equipped to study at TAMU than those who apply through the regular process because we have a better idea of their abilities in English). It is anticipated that the demand will grow once the initial groups of students report back to their colleagues in Qingdao. Discussions with the administration at OUC suggest that they may be prepared to expand the program if demand is there and if OCNG is willing and able to take the additional students.

A reciprocal program for U.S. students to study at OUC, with an annual number equal to that of Chinese students accepted at TAMU, will be possible. Having to take classes in Chinese, however, is a major barrier to such reciprocal efforts for most students. We anticipate, however, that more students will be able to carry out research there through a joint research program currently under development.
4. Job market needs (identify specific potential employers and supply names, addresses and phone numbers where possible).

Students graduating from TAMU OCNG have found employment at many state, federal, local and private entities, including academia. The ultimate aim for many students is to continue in marine research. Some have gone on to post-doctoral study at places as diverse as the University of California at Berkeley, Michigan State University, the Universities of North Dakota and Washington, and the University of Nagasaki (Japan). Others have gained faculty positions at institutions such as Mississippi State University, the University of South Florida, and the Institute of Physics in Montevideo, Uruguay, or research positions (e.g., at the Bigelow Marine Laboratory, the Universities of Maryland or North and South Carolina, Rensselaer Polytechnic, and the Universidade Federale in Rio Grande – Brazil).

Government organizations (state and national) account for others. These range from the Texas Parks and Wildlife and Water Development Boards as well as state departments in Florida and New York to national laboratories and federal agencies (e.g., the Department of Energy, EPA, NOAA, National Aeronautics and Space Administration (NASA), National Marine Fisheries Service, Office of Naval Research (ONR), U.S. Coast Guard). Since we have many international students, it is not surprising that many of them return to government positions in their own countries, such as the Chinese Academy of Science in Qingdao, the Navy and KORDI (Korea), the Navy in Ecuador, or the Instituto Mexicano de Petroleo (Mexico).

Other graduates go into industry, either as consultants (mainly to the oil and gas industry) or to companies such as C & C Technologies, NSC Subsea, Fugro, Anadarko, British Petroleum, Shell and Exxon-Mobil. At present there is a dearth of qualified people for the oil patch, and graduates who can assist in finding and developing the next sources of energy are being picked up by industry almost before the ink is dry on their diplomas.

Finally, there are graduates who choose very different career paths after graduation. In the past five years or so we have had several who went into high school teaching, one who joined the Heinz Center for Science and the Environment in D.C., one who became a Knauss Fellow (also in D.C.), and one who is currently in the financial industry. Taken overall, our students generally seem able to find suitable positions without too much trouble in a variety of fields.

Texas is a coastal state with large economic and cultural dependence on fisheries and environmental quality. Students graduating from closely-related graduate programs have obtained a broad variety of positions, including the following: teaching and research positions in institutions of higher education within Texas and in other parts of the United States; professional positions (medicine, dentistry, law); employment in private, non-profit, state or federal entities; and teaching positions in public or private schools.

Given the continuing economic expansion of China, the country is facing real problems in the coastal zone from pollution and infrastructure development. It is also subject to the effects of coastal storm surges, which are likely to increase in strength and frequency as global warming continues. Oil exploration is a growing concern. The country relies on fisheries for a large portion of its protein requirements; some of these are presently at risk from pollution. Students trained through this program will be able to help ensure the viability of the coastal region by providing technical expertise on biological, chemical and
5. Educational and cultural needs of the community.

There is a continuing and growing demand for oceanographers within China, and oceanography has been identified as a priority area for the next decade by the Chinese leadership. The main aim of the program is to train students who will become future leaders of the field in their country when they return to China. However, it is possible that some may wish to return to the U.S., as there is a clear continuing need for oceanographers of all types, particularly at present for those able to work in the oil industry.

C. Campus (College, Research Institute and Department) needs.

OCNG needs graduate students as GARs in extramurally funded research programs. Graduate students are also needed as GATs in undergraduate oceanography courses. A variety of research institutes and programs in College Station and Galveston will benefit from the association with the OCNG JDP. These include the Integrated Ocean Drilling Program, Texas Sea Grant, Texas Institute of Oceanography, the Laboratory for Oceanographic and Environmental Research, and the Geophysical and Environmental Research Group. These organizations (and others) currently support graduate students (through grants to professors and research scientists at TAMU) and will continue to have needs that may be met by graduates of the OCNG JDP. This may lead to employment within the U.S. for some of the graduates following graduation from the program.

OCNG presently has only about 75 graduate students, when formerly the department hosted more than 100. We see this program as a way to increase teaching and student mentoring loads to meet university guidelines and to increase our research output.

V. PROGRAM POTENTIAL

A. Estimate the cumulative headcount and full time equivalent (FTE) enrollment for each of the first five years (majors only, considering expected attrition and graduation) and indicate the number expected to be new to the institution each year.

Table 3. Estimated number of Ph.D. students enrolled in the OCNG JDP for the first five years.

<table>
<thead>
<tr>
<th>Year</th>
<th>New</th>
<th>Total</th>
<th>Graduated</th>
<th>Year End</th>
<th>Year End</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Attrition</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>Ph.D.</td>
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<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Ph.D.</td>
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<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Ph.D.</td>
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<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Ph.D.</td>
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<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Ph.D.</td>
<td>5</td>
<td>25</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
B. Explain assumptions used in making these estimates.

Based on interviews with OUC, it is anticipated that five students will enter the graduate program in the first year. In the following years, up to five new students will be added annually such that the OCNG JDP reaches a steady-state number of about 20 students in residence at any given time. It is understood that the scholarships from the China Scholarship Council will be for up to five years residence at TAMU, although it is anticipated that most students will finish within four years.

At this stage it is not possible to forecast attrition rates, but it is likely that any student failing to complete his or her Ph.D. studies will at least obtain the M.S. degree.

VI. RESOURCES

A. Personnel.

1. Describe any personnel additions or changes in the past three years made in anticipation of the program.

No new faculty members have been hired solely to provide courses for the proposed degree. The TAMU faculties along with MARB and MARS faculty at TAMUG have the expertise to offer the wide variety of courses required in the various disciplines of oceanography. The newest reinvestment hires at TAMU will be expected to establish a research program and mentor graduate students as well, and thus will expand the offerings of the graduate program.

2. Indicate for the first five years the cumulative number of FTE personnel who would be involved in delivery of the program in each of the following categories:

Table 4. Number of FTE personnel involved in delivery of the OCNG JDP.

<table>
<thead>
<tr>
<th>Year</th>
<th>Admin. FTE</th>
<th>Full Time FTE</th>
<th>GAT FTE</th>
<th>FTE</th>
<th>Support Staff FTE</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.6</td>
<td>0</td>
<td>0.2</td>
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<tr>
<td>2</td>
<td>0.1</td>
<td>1.2</td>
<td>0</td>
<td>0.4</td>
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<tr>
<td>3</td>
<td>0.1</td>
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<td>0</td>
<td>0.5</td>
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</tr>
<tr>
<td>4</td>
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<tr>
<td>5</td>
<td>0.1</td>
<td>3.0</td>
<td>0</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Administrative FTE's include the TAMU SGA and department head.
Support staff FTEs includes OCNG staff.

At present OCNG has 36 faculty, including joint appointments at TAMU Galveston, or within WLFS or ATMQ in College Station. Any or all of these may be involved with the program, depending on (a) which courses are given in a particular year, and (b) which of them are involved in the SACs for students enrolled in the program.
3. List current faculty members who would be qualified to participate, indicating highest earned degree and institution, field of study, current teaching and research assignments, dates of appointment, and anticipated contribution to the program. Specify course(s) faculty members teach which could be available to participating students.

A. TAMU faculty

Rainer Amon, Assistant Professor, Department of Marine Sciences, Texas A&M University at Galveston
Faculty Member Since: 2003
PhD 1995, The University of Texas at Austin
Field of Study: Biogeochemical fluxes of dissolved organic matter (DOM) in the Arctic Ocean; Land-ocean transport of carbon and nitrogen in light of environmental change in the Arctic; Identification of the chemical composition of DOM and its use as a tracer for water masses; The role of environmental factors for the activity and community composition of aquatic bacteria; The role of bacteria for the carbon cycle in the ocean, estuaries, and rivers; Relationships among DOM composition, UV-radiation, trace elements, and microbes
Courses Offered: Introduction to Chemical Oceanography (MARS 440); Introduction to Biological Oceanography (OCNG 420); Modern Oceanographic Observational & Analysis methods (MARS 489)

Ayal Anis, Assistant Professor, Department of Marine Sciences, Texas A&M University at Galveston
Faculty Member Since: 2000
PhD 1994, Oregon State University
Field of Study: Small-scale physical processes, such as turbulence, in oceans and lakes; Mixing processes in the surface and bottom boundary layers in oceans and lakes; Air-sea interactions and physics of heat and momentum transfer between the atmosphere and the aquatic boundary layer (specifically, convective and surface-wave related processes); Physical Oceanography of coastal regions; Model-aided analysis of the response of lakes/coastal regions to external (atmospheric) forcing.
Courses Offered: Physical Oceanography (MARS 410/OCNG 608), MASE 310 Engineering Analysis

Thomas Bianchi, Professor
Faculty member Since: 2006
PhD 1987, University of Maryland
Field of Study: Organic Geochemistry; Application of Chemical Biomarkers (e.g. lignin-phenol, plant pigments, alkenones, amino acids) in Carbon and Nitrogen Cycling; Dynamics; Biogeochemical Dynamics in Aquatic Food Chains; Carbon Cycling in Riverine, Estuarine and Coastal Ecosystems; Biochemical Markers of Colloidal and Particulate Organic Carbon
Courses offered: Oceanography 401 - Introduction to Oceanography; Oceanography 645 - Marine Organic Geochemistry; Oceanography 649 - Estuarine Biogeochemistry

Doug Biggs, Professor
Faculty member since: 1977
PhD 1976, Massachusetts Institute of Technology
Field of Study: Physical and biological habitat use by sperm whales and other apex predators in the Gulf of Mexico (extends through summer 2008); Biogeochemical processes in Gulf of Mexico mesoscale eddies; Zooplankton stock estimation from ADCP backscatter intensity
Courses offered: OCNG 401 Introduction to Oceanography, OCNG 620 Biological Oceanography

Robin Brinkmeyer, Assistant Professor
Faculty member since: 2006
PhD. 2003, University of Bremen, Germany
Field of Study: Molecular microbial biology; molecular systematics and phylogeny of prokaryotes; biogeography of prokaryotic populations; role of bacteria in biogeochemical processes
Courses offered: Genetics laboratory
David Brooks, Professor
Faculty member since: 1978
PhD 1975, University of Miami
Field of Study: Dynamics of shelf, marginal and coastal seas; western boundary current fluctuations; observational and modeling studies in shelf and coastal ecosystems; tidal-power generation
Courses Offered: OCNG 612 Waves and Tides

Bill Bryant, Professor
Faculty member since: 1963
PhD 1966, University of Chicago
Field of Study: Ocean Engineering; Marine sedimentation; Archeological Oceanography; Geotechnical and geoaoustic properties of marine sediments; Geology and geophysics of the Gulf of Mexico and Caribbean Sea; Microfabrics of fine-grained marine sediments; Geology and Geophysics of the Russian Arctic
Courses Offered: OCNG 673 High-Resolution Marine Geophysics

Lisa Campbell, Professor
Faculty Member Since: 1996
PhD 1985, SUNY Stony Brook
Field of Study: Phytoplankton Ecology; Phytoplankton community structure and diversity; Harmful algal blooms: Karenia brevis in coastal Texas waters; Picoplankton diversity; Flow cytometry and in situ imaging
Courses offered: OCNG 420 Introduction to Biological Oceanography; OCNG 625 Current Topics in Biological Oceanography; OCNG 654 Plankton Ecology

Ping Chang, Professor
Faculty member since: 1990
PhD 1988, Princeton University
Field of Study: Climate Variability and Predictability; Coupled Climate Modeling; Ocean Atmosphere Interactions; Geophysical Fluid Dynamics; Numerical Ocean Modeling
Courses Offered: OCNG 615 Numerical Ocean Modeling I; OCNG 616 Numerical Ocean Modeling II; OCNG 617 Theories of Ocean Circulation; OCNG 612 Elements of Ocean Wave Theory; OCNG 614 Dynamics of the Ocean and Atmosphere; OCNG 651 Meteorological Oceanography

Piers Chapman, Professor and Department Head
Faculty member since: 2007
PhD 1982, University College of North Wales, U.K.
Field of Study: Marine chemistry- nutrient cycling in coastal areas, and their use as tracers as a means of identifying large-scale oceanic circulation patterns; the marine iodine cycle; The physics and chemistry of upwelling areas; Low oxygen regimes in the ocean; Marine pollution- oil production control methods, particularly dispersant usage.
Courses: none

Timothy DellaPenna, Assistant Professor, Texas A&M University at Galveston
Faculty Member Since: 2000
PhD 1999, College of William and Mary
Field of Study: Seabed dynamics and sedimentary processes in marine systems.
Courses Offered:

Steve DiMarco, Associate Professor
Faculty Member Since: 1993
PhD 1991, University of Texas at Dallas
Field of Study: Physical Oceanography of Gulf of Mexico and southwest Indian Ocean; Hypoxia of the northern Gulf of Mexico; Ocean Observing Systems; Nonlinear surface wave interaction; Impact of extreme wind events on shelf circulation; Tidal currents and heights in the Gulf of Mexico; Oceanographic database management; Texas drought and regional climate analysis
Courses offered: OCNG 657 Data Methods and Graphical Representation in Oceanography; OCNG 604 Ocean Observing Systems, OCNG 689 Sp Tp Oceanographic Computing Laboratory

Wilford Gardner, Professor
Faculty Member Since: 1985
PhD 1978, Massachusetts Institute of Technology
Field of Study: Dynamics and biogeochemistry of marine particles - microns to macroaggregates; Bio-optics and hydrodynamics; Remote sensing and particulate organic carbon (POC); Sediment transport in the ocean from the continental shelf to the deep sea.

Courses Offered: OCNG 662 Coastal and Marine Sedimentary Processes, OCNG 663 Particle Dynamics and Fluxes

Benjamin Giese, Associate Professor
Faculty Member Since: 1994
PhD 1989, University of Washington
Field of Study: Coupled ocean-atmosphere modeling; Interannual climate variability; Climate change; data assimilation.
Courses Offered: GEOS 410 Global Change; OCNG 651 Meteorological Oceanography; OCNG 451 Mathematical Modeling of Ocean Climate

Robert Hetland, Associate Professor
Faculty Member Since: 2000
PhD 1999, Florida State University
Field of Study: Regional and coastal numerical modeling; Continental shelf dynamics; Estuaries and river plumes.
Courses Offered: OCNG 609 Dynamical Oceanography; OCNG 689 Sp Tp in Coastal Dynamics

George Jackson, Professor
Faculty Member Since: 1989
PhD 1976, California Institute of Technology
Field of Study: Biological-chemical-physical modeling; Coagulation processes/particle dynamics; Marine pollution; Small-scale processes; Coastal ecosystems
Courses Offered: OCNG 610 Mathematical Models of Marine Ecosystems; OCNG 620 Biological Oceanography, OCNG 646 Dynamics of Colloids in the Environment (with P. Santschi); OCNG 660 Implementing Marine Ecosystem Models

John Kessler, Assistant Professor
Faculty member Since: 2008
Ph.D. 2005, University of California, Irvine
Field of Study: Stable isotope analysis of methane and other materials; Organic geochemistry; Instrument Design.
Courses Offered: None

Patrick Louchoeur, Associate Professor, Texas A&M University at Galveston
Faculty Member Since: 2006
PhD 1997, University of Quebec in Montreal, Canada
Field of Study: Tracers of combustion by-products in environmental media; Environmental impact of watershed disturbance on cycling of trace metals and organic matter; Biogeochemical cycling of organic matter (isotope and organic geochemistry) in soils and aquatic environments; Paleolimnology and Paleooceanography.
Courses Offered: Instrumental Analysis, Multidisciplinary Oceanography and Environmental Economics

Mitch Lyle, Professor
Faculty Member Since: 2006
PhD 1978, Oregon State University
Field of Study: Paleoceanography of the Cenozoic Pacific The North American water cycle: linkages between the North Pacific paleoceanographic change and precipitation in the US (emphasis on western US) on both Cenozoic and millennial time scales. Biogenic sedimentation and biogeochemical feedbacks between the carbon cycle and climate. Regional seismic stratigraphy of the Pacific Ocean. Pleistocene dynamics of the California Current system. Using high-resolution seismic reflection and sediment drilling for basin analysis and climatic reconstructions. How physical properties of sediments (bulk density, magnetic susceptibility, p-wave velocity, color) encode sedimentological changes and climate signals.
Courses Offered: OCNG 689 SP TP Deep Sea Sediments

Heath Mills, Assistant Professor
Faculty Member since: 2007
Ph.D. 2004, Georgia Institute of Technology
Field of Study: Molecular characterization of microbial communities; metabolism of microbial communities; life in extreme environments.

Courses Offered:

John Morse, Professor
Faculty Member Since: 1981
PhD 1973, Yale University
Field of Study: Application of chemical thermodynamics, surface chemistry and chemical kinetics to the study of natural waters and sediments; Sedimentary geochemistry of carbonate and sulfide minerals; Biogeochemistry of benthic communities; Subsurface sequestration of CO₂
Courses Offered: OCNG 641 Marine Chemistry; OCNG 652 Sedimentary Biogeochemistry

Alejandro Orsi, Associate Professor
Faculty Member Since: 2005
PhD 1993, Texas A&M University
Field of Study: Physical Oceanography, Global Thermohaline Circulation, Ocean Climate Variability; Currents and water mass structure of the Southern Ocean; Role of polar regions in Climate Change; Ventilation, Convection, Subduction; Analysis of oceanic tracer data and direct current measurements; Management of hydrographic atlas and database of the Southern Ocean
Courses Offered: OCNG 689 Global Scale Oceanography; OCNG 608 Physical Oceanography; GEOS 489/689 Special Topics in the International Polar Year

Antonietta Quigg, Assistant Professor, Texas A&M University at Galveston
Faculty Member Since: 2003
PhD 2000, Monash University, Australia
Field of Study: Impact of trace metal and nutrient (N, P) enrichments, cycling and dynamics on physiology, primary productivity, and community composition in coastal ecosystems; Development of bioassays using ecologically relevant marine fauna, for toxicity studies and bioremediation; Ecological stoichiometry biology of elements from molecules to the biosphere; Evolution of phytoplankton and development in the field of geobiology through interdisciplinary research.
Courses Offered: Marine Botany; Seminar in Marine Biology; Special Topics in Marine Sciences; Biological ocean cruises

Mary Jo Richardson, Regents Professor
Faculty Member Since: 1986
PhD 1980, Massachusetts Institute of Technology
Field of Study: Dynamics and biogeochemistry of particle formation, sinking, resuspension, transport and deposition in the ocean from the continental shelf to the deep sea and from surface waters to the seafloor.
Courses Offered:

Daniel Roelke, Associate Professor
Faculty Member Since: 2004
PhD 1997, Texas A&M University
Field of Study: Field studies, laboratory experiments, and numerical modeling simulations that address lower foodweb ecology in aquatic ecosystems. Emphasis is placed on complex biotic interactions with the physicochemical environment.
Courses Offered: WFSC 414 Limnology; WFSC 489 Coastal Zone Ecology; WFSC 611 Estuarine Ecology; WFSC 612 Aquatic Ecology

Gilbert Rowe, Regents Professor, Texas A&M University at Galveston
Faculty Member Since: 1987
PhD 1968, Duke University
Field of Study: Benthic ecology; Ecosystem function and structure; Carbon and nitrogen cycles; Food chain models; Environmental quality and sustainable development.
Courses Offered: Benthic Ecology, Biological Oceanography

William Sager, Professor
Faculty Member Since: 1983
PhD 1983, University of Hawaii
Field of Study: Plate tectonics; Tectonic reference frames; Paleomagnetism and environmental magnetism; Magnetostratigraphy and the magnetic polarity reversal time scale; Pleistocene-Holocene sea level variations; High-resolution geophysical methods; Magnetic and gravity field interpretation.

Courses Offered: OCNG 630 Geological Oceanography; OCNG 681 How to Write and Publish a Scientific Paper; OCNG 666 Principles of Geodynamics; OCNG 689 Sp Tp in High-resolution Seafloor Mapping

Peter Santschi, Professor, Texas A&M University at Galveston
Faculty Member Since: 1988
PhD 1984, Swiss Federal Institute of Technology, Zurich, Switzerland
Field of Study: Chemical Oceanography; Marine Isotope Geochemistry; Coagulation processes/colloid composition and dynamics; Trace element and actinide binding to exopolymeric substances; Land-Ocean interactions.

Courses Offered: OCNG 644 Isotope Geochemistry; OCNG 646 Dynamics of Colloids in the Environment (with G. Jackson); CHEM 383 Environmental Geochemistry; MARS 340 Geochemistry

Matthew Schmidt, Assistant Professor
Faculty Member Since: 2007
PhD 2005, University of California, Davis
Field of Study: Paleoclimatology, Paleoceanography; Geochemistry

Courses Offered:

Anya Schultz, Assistant Professor
Faculty Member since: 2006
PhD 2001, University of Victoria, Canada
Field of Study: Biology of marine worms; invertebrate zoology

Courses offered: Marine invertebrate zoology

Martha Scott, Associate Professor
Faculty Member Since: 1974
PhD 1966, Rice University
Field of Study: Chemical oceanography; Uranium series isotopes in the environment; Man-made isotopes in the environment; Natural and artificial radionuclides as tracers for material transport in the ocean; Exchange of materials between the coastal ocean and the open ocean; Residence times of pollutants and tracers on land and in various landscape reservoirs.

Courses Offered:

Niall Slowey, Professor
Faculty Member Since: 1991
PhD 1991, Massachusetts Institute of Technology
Field of Study: Paleoceanography, Acoustic and physical properties of marine sediments; Processes of carbonate sedimentation

Courses Offered: OCNG 674 Paleoceanography; OCNG 630 Geological Oceanography

Bob Stewart, Professor
Faculty Member Since: 1989
PhD 1969, University of California, San Diego
Field of Study: Production of oceanographic teaching materials for elementary, middle, and high school students and teachers (example: OceanWorld); Improvement of teaching oceanography; Large-scale, low-frequency variability of ocean currents

Courses Offered: OCNG 401 Introduction to Oceanography; OCNG 410 Introduction to Physical Oceanography; OCNG 600 Survey of Oceanography; OCNG 608 Physical Oceanography

Achim Stössel, Associate Professor
Faculty Member Since: 1994
PhD 1990, University of Hamburg, Germany
Field of Study: Sea-ice-ocean modeling; Atmosphere-sea-ice-ocean interactions; Polar boundary-layer processes; Impact of polar processes on global ocean properties and circulation; Variability of deep western boundary currents.

Courses Offered: OCNG 608 Physical Oceanography; OCNG 410 Introduction to Physical Oceanography; OCNG 615 Numerical Modeling of Ocean Circulation; OCNG 614 Dynamics of the Ocean and Atmosphere
Debbie Thomas, Assistant Professor
Faculty Member Since: 2004
PhD 2002, University of North Carolina, Chapel Hill
Field of Study: Paleocenography of the Cretaceous and Cenozoic; global tectonism and the evolution of the earth’s climate system; transitions between "greenhouse" and "icehouse" climate states; Greenhouse-icehouse transitions during the Paleozoic; Potential regulating role of thermohaline circulation on global climate under different boundary conditions; Evolution of wind intensity and eolian sediment source variability through the Cretaceous and Paleogene; Tectonics (e.g., oceanic gateway changes and major volcanic events) in environmental change.
Courses Offered: GEOS 410 Global Change; OCNG 674 Paleocenography; OCNG 430 Geological Oceanography

Dan Thornton, Assistant Professor
Faculty Member Since: 2004
PhD 1996, Queen Mary College, University of London, U.K.
Field of Study: Marine ecology and biogeochemistry; carbon and nitrogen cycling in marine ecosystems.
Courses Offered: OCNG 622 Analysis of Benthic Communities; OCNG 627 Ecology of the Continental Shelf; OCNG 652 Sedimentary Biogeochemistry

Andrew Vastano, Professor
Faculty Member Since: 1962
PhD 1967, Texas A&M University
Field of Study: Mesoscale dynamics; Satellite and fisheries oceanography; Distributional ecology.
Courses Offered:

John Wormuth, Professor
Faculty Member Since: 1972
PhD 1971, Scripps Institution of Oceanography
Field of Study: Faunal characterization of sperm whale feeding areas in the Gulf of Mexico; Annual variability of zooplankton (and krill) in the Antarctic; Geographic variations in diel vertical migrations in pteropods, copepods and cephalopods; Geographical distributions and taxonomy of cephalopods.
Courses Offered: OCNG 401 Introduction to Oceanography; OCNG 654 Plankton Ecology

Shari Yvon-Lewis, Assistant Professor
Faculty Member Since: 2004
PhD 1994, University of Miami
Field of Study: Global oceanic uptake and emission of climatically important trace species; Developing HCFCs as water mass tracers; Air/sea exchange and coastal air quality/water quality.
Courses Offered: OCNG 440 Introduction to Chemical Oceanography; OCNG 640 Chemical Oceanography

B. OUC faculty

Ge Chen, Professor of Information Science and Engineering-OUC
Faculty member since 1997
Ph.D: 1993, Ocean University of China
Field of study: Ocean Remote Sensing, Ocean GIS
Courses offered: Geographical Information System and Remote Sensing

Xueen Chen, Associate Professor
Faculty Member Since: 1997
PhD 2002, University of Hamburg
Field of Study: Operational Oceanography: Dynamics of shelf, marginal and coastal seas, Tidal currents and heights over Chinese Shelf, Tidal-power generation, Storm surges, Ocean observing systems, Oceanographic database, Data assimilation; Climate Changes: Coupled climate modeling, Sea level and climate changes, Atmosphere-sea-ice-land-ocean interactions, Impact of polar processes on global ocean, Global carbon cycling
Courses offered: General ocean Circulation

Zhenming Chi, Professor of Marine Life Science-OUC
Faculty member since: 2002
Ph.D:1997, Shandong University
Field of study: Microbiology and Marine Microbiology
Courses offered: Marine Biology and Fisheries, Marine Microbiology

Gang Fu, Professor of Meteorology-OUC
Faculty member since 1987
Ph.D: 1999, University of Tokyo, 1997 Ocean University, Qingdao
Field of study: Marine Meteorology
Courses offered: Climate Changes

Huiwang Gao, Professor of Environmental Science and Engineering-OUC
Faculty member since 1996
Ph.D: 1996, Institute of Atmospheric Physics, CAS
Field of study: Marine and atmospheric fluid dynamics and modelling
Courses offered: Introduction to Environmental Science

Xiangzhong Gong, Associate Professor of College of Marine Life Sciences-OUC
Faculty member since 1984
M.Sc: 1999, Ocean University of China
Field of study: Algae Experimental Ecology
Courses offered: Phycorel/Marine Botany

Changlong Guan, Professor of Physical and Environmental Oceanography -OUC
Faculty member since: 1992
Ph.D: 1992, Ocean University of China
Field of study: Wave Numerical Simulation
Courses offered: Waves in the Ocean

Wensheng Jiang, Professor of Marine Geoscience,
Faculty member since: 1997
Ph.D: 1999, Ocean University of China
Field of study: Shallow Sea Dynamics
Courses offered: Storm Surges, Computational Geophysical Fluid Mechanics

Guangxue Li, Professor of Marine Geo-Science -OUC
Faculty member since: 2000
Ph.D: 1998, Ocean University of China
Field of study: Estuary and Shelf Environmental Engineering Geology
Courses offered: Introduction to Submarine Exploration Methodology

Tie Li, associate professor of marine chemistry in College of Chemistry and Chemical Engineering-OUC
Faculty member since 1984
PhD 2004, Graduate School of Science, Nagoya University, Japan
Field of study: Settling fluxes of biological products and relating materials in the ocean.
Air-borne dust and its effect on marine biological production.
Isotopic assessments on biogeochemical cycles and environmental changes in the ocean.
Courses offered: Chemical Oceanography (undergraduate course)
Analytical Chemistry of Seawater (graduate course)

Xiaopei Lin, Associate Professor – OUC
Faculty member since 2004
Ph.D: 2004, Ocean University of China
Field of study: Geophysical Fluid Dynamics
Courses offered: Geophysical Fluid Dynamics; ocean circulation

Su Mei Liu, Professor of Marine Chemistry -OUC
Faculty member since 1992
Ph.D: 2001, Ocean University of China
Field of study: nutrient cycling
Courses offered: Marine Biogeochemistry for Ph.D students
An Introduction to Marine Biogeochemistry for Master students
Jilin Sun, Professor of Atmosphere Science
Ph.D: 1998, Ocean University of China
Field of study: Ocean-Atmosphere Interactions in SCS and North Pacific; West boundary current and its effect on the climate
Courses offered: tropical air-sea interaction; climate change

Houjie Wang, Associate Professor of College of Marine Geosciences-OUC
Faculty member since 2002
Ph.D: 2002, Ocean University of China
Field of study: Hydrodynamics and Sediment Transport in Estuary and Coastal Ocean
Courses offered: Sedimentary dynamics in estuary and coastal ocean

Qi Wang, Professor of Atmosphere Science
Faculty member since 1982
Ph.D: 1998, Ocean University of China
Field of study: Ocean-Atmosphere Interactions in SCS and North Pacific; West boundary current and its effect on the climate
Courses offered: Ocean-Atmosphere Interactions; Geophysical Fluid Dynamics;

Zhenyu Wang, Professor of Environmental Studies, College of Environmental Science and Engineering-OUC
Faculty member since 2004
Ph.D: 2001, Technische Universitaet Muenchen, Germany
Field of study: Environmental Ecology, Bioremediation, Rhizosphere Ecology
Courses offered: Basic Ecology, Theory and Method of Bioremediation

Dexing Wu, Professor of College of Physical and Environmental Oceanography-OUC
Faculty member since 1974
Ph.D: 1992, Ocean University of China
Field of study: Theoretical Oceanography, General Ocean Circulation, Ocean Modelling
Courses offered: Physical Oceanography

Lixin Wu, Professor of Physical and Environmental Oceanography-OUC
Faculty member since 2005
Ph.D: 1994, Peking University
Field of study: Ocean Circulation Dynamics and Model, Global Climate Changes Courses offered: Physical Oceanography, Climate Changes

Guanpin Yang, Professor of Marine Geo-Science-OUC
Faculty member since 2000
Ph.D: 1992, Huazhong Agricultural University: Postdoc: 1995, Virginia Tech University, USA
Field of study: Molecular Ecology
Courses offered: Molecular Ecology

Guipeng Yang, Professor of Chemical and Chemistry Engineering-OUC
Faculty member since 1983
Ph.D: 1998, Ocean University of China, Posdoc: Hokkaido University, JP
Field of study: Marine Chemistry
Courses offered: Marine Chemistry

Zhigang Yu, Professor of Marine Chemistry-OUC
Faculty member since 1988
Ph.D: 1999, Ocean University of China
Field of study: Marine Biogeochemistry, Marine Environmental Science
Courses offered: Environmental Chemistry; Marine Ecological Chemistry

Shikui Zhai, Professor of Marine Geoscience-OUC
Faculty member since: 1999
Ph.D: 1988, Ocean University of China
Field of study: Marine Geochemistry, Marine Geology
Courses offered: None at present (Deputy Director of OUC)
Jiping Zhao, Professor of College of Physical and Environmental Oceanography-OUC

Ph.D.: 1990, Ocean University of China
Field of study: Physical Oceanography, Polar Oceanography
Courses offered: Polar Oceanography, Descriptive Physical Oceanography

Dongliang Zhao, Professor of College of Physical and Environmental Oceanography-OUC

Faculty member since 1997
Ph.D. 1997, Ocean University of China
Field of study: Air-sea boundary processes; Ocean remote sensing
Courses offered: Oceanography; Introduction of wind waves; Physics on air-sea boundary layer

4. If current faculty would be teaching new courses, how would their teaching assignments change, and how would their current assignments be accommodated?

Teaching assignments are not expected to change drastically, although faculty do change course content or introduce new courses on an ongoing basis. Course offerings will also change from year to year as the student population and its interests change.

5. List all new positions (faculty, graduate assistant, clerical support, etc.) required during the first five years of the program and indicate whether the positions would be additions or reassignments. If reassignment, indicate the source.

The OCNG JDP can be managed with the present faculty and administrative and staff support in OCNG. However, as current faculty members retire or move to new positions, new appointments will be made to replace them. This may result in changes to teaching loads and which courses are offered in a particular semester. At present the TAMU Oceanography Department has excess teaching capacity; adding additional students through this program will help ensure that courses “make” on a more regular basis.

6. Describe qualifications that would be sought in new faculty indicating the expected level of appointment and anticipated contributions to the program (including research grants, contract resources, etc.).

Any new hires will depend upon program and department growth and existing faculty expertise. Future hires will likely be at the level of Assistant Professor. These individuals will hold the Ph.D. degree, will have a strong teaching and research background, and will mentor graduate students. As active faculty members, they will be expected to submit grant proposals, conduct research in their fields, form collaborative units with existing faculty, and publish the results of their research. At present, the faculty is biased towards full professors; as they retire or change employment we shall approach a more even distribution among the three faculty ranks.

7. For graduate programs:

a. Describe departmental policy regarding chairing or serving on thesis/dissertation committee, number of students supervised at one time, etc.

Any faculty member with graduate faculty status in OCNG may serve on a committee. To co-chair a committee the faculty must be also a member of the OCNG JDP graduate faculty. No limits have been set on the number of students who can be mentored, or the
number of student committees on which a faculty member may serve. This is left to the
discretion of the individual faculty member based on their ability to support financially
students and to be able to devote adequate time to them.

A member of the OUC OCNG JDP must be the other committee co-chair.

b. Identify faculty who would supervise theses, dissertations, and internships, etc.:
provide examples of their ongoing research projects and scholarly publications.

The faculty members listed in section VI are the same ones who will supervise the
graduate students in the proposed program. The courses they have taught, their research
interests, the numbers of graduate students they have mentored, and selected
publications are included in Appendix B.

B. Library.

1. List any library holdings added in the past three years in anticipation of the program.

Oceanography has always been well represented in the collection at TAMU. No specific
additions have been made for the purposes of this program.

The library of OUC has established a Database of Marine Education and Technological
Documents with more than 100,000 entries. The Museum of Digital Marine Biology is
presently being developed.

2. Evaluate library holdings relevant to the proposal, noting strengths and weaknesses.
Describe actions that will be taken to maintain strengths and remedy weaknesses.

Texas A&M University, Evans Library holdings are Books, Serial, Backfiles & Other
Paper Materials (including government documents): 3,110,123; E-Books: 1,438
Microforms: 5,457,131; Audiovisual Materials: 324,347; Current Serial Subscriptions:
49,242

The library of OUC has 1,728,337 printed books (including back issues), 556,866 e-books
and 36,000 current periodicals (including printed and electronic periodicals). The library
collection concentrates on marine and fishery science, and the Foreign Language Database
is available for the students to do their research. All these resources are free for teachers
and students via the campus internet.

3. Describe cooperative library arrangements available to students in this program.

The library of OUC will offer nontraditional students Reader's Cards (also called Campus
Cards) when they enroll at OUC, and the nontraditional students will share the same rights
as the Chinese students, e.g., borrow books, periodicals, obtain information, and all the
other services. The staff of Reference Department will guide the nontraditional students to
utilize the library.

4. Assessment of library resources necessary for proposed program.
Because we already have a PhD program in Oceanography, no significant new English language resources are needed at TAMU. We presume that additional Chinese language publications will be added over time, if needed.

OUC is a comprehensive university with its strength in oceanography and fisheries science. We have plentiful Chinese resources and systematic teaching material, and also collect a considerable amount of English language material about the field of oceanography. We will add further English language publications in the coming days.

C. Equipment

1. List any equipment acquired in the past three years for the program.

The OCNG department has purchased equipment on a more or less continuous basis, but none has been purchased specifically for this program. Some of this equipment belongs to the department, but considerably more has been purchased by individual researchers for use in numerous research activities. All this equipment is essentially available for student use. Individual researchers maintain their own laboratories and students will generally tend to use equipment owned by the co-chair or other members of their SAC.

Apart from the normal laboratory equipment such as fume hoods, balances and general glassware, individual researchers possess many different analytical instruments and within the department we can make analyses of almost any substance in seawater, biological tissue and sediments. Instrumentation available, either at TAMU or at Galveston, includes UV spectrophotometers for colorimetric analysis, specific ion electrodes, gas chromatographs, high-pressure liquid chromatographs, atomic absorption spectrophotometers and ICP equipment, and coupled gas chromatographs and mass spectrometers. Additionally, there are facilities for working with stable and radioactive isotopes; the College of Geosciences at TAMU is presently developing a major isotope facility that will be used by researchers within all four departments in the College and from elsewhere on campus. This is expected to be operational by the end of the summer in 2008.

The Integrated Ocean Drilling Program has an extensive core library obtained during many deep-sea drilling cruises that is maintained for the use of international and national researchers. This facility may be used by graduates within the JDP as necessary. Equipment for making many different measurements on these cores is available either within the department or at IODP. The department also has a flume for studying the effects of currents on ocean particles.

As regards biological analyses, facilities are available for cultivating planktonic organisms and working with bacterial cultures.

A separate extensive equipment base for research service and educational purposes exists at the Geochemical and Environmental Research Group (GERG). This includes equipment for field use, such as current meters, pressure sensors, and buoy and mooring equipment. These instruments are used by several members of the faculty at OCNG. GERG also maintains analytical instrumentation, laboratory facilities, and computer systems that provide the tools needed to fulfill the needs of an extensive list of programs, dealing with analyses of samples for nutrients, trace metals, and organic pollutants.
Since going to sea is an important part of an oceanography degree program, the department has access to small boats (via Galveston), and will have access to an 83-foot twin-hulled vessel currently being fitted out for work on the Flower Gardens Banks by the U.S. National Oceanographic and Atmospheric Administration (NOAA). This ship will be based in Galveston. At present, we do not own a larger vessel for deep-sea work, but we are examining ways to acquire access to such a vessel when needed.

The latest equipment acquired by the department is an autonomous underwater vehicle (AUV), which can be fitted with various sampling devices, such as cameras or electronic sensors. This allows sampling to be carried out over a wide area much faster than by traditional ship-based methods.

Like most sciences, oceanography is becoming more reliant on computers for data collection and analysis. The department is well-equipped in this sphere, with numerous servers and individual machines. Two laboratories exist for use by those students who do not possess their own personal computers.

2. Itemize expenditures for major additional specialized equipment and supplies needed for the program for each of the next five years.

No specialized equipment or supplies are needed at this time for the program. Participating faculty members at the two campus facilities have extramurally-funded research projects, which fund equipment used extensively by graduate students registered in related departments. Other equipment purchases have been made to support the large undergraduate teaching program that emphasizes hands-on learning in both labs and fieldwork, and some of this equipment has already been used and will continue to be available for graduate student use. Faculty members collaborate extensively with other departments and have access to specialized equipment in those departments.

D. Facilities

1. Describe facilities added or modified in the past three years in anticipation of the program.

No facilities have been remodeled specifically for this program. However, OCNG has a process for renovating laboratories as faculty members retire and new faculty, with possibly different interests, are appointed. During the past three years four laboratories have been renovated at College Station following the arrival of new faculty members. Two more are scheduled for renovation in the near future. Additionally, the department has remodeled the laboratories needed to house the new stable isotope facility, while the College is renovating the laboratories required for the radioisotope facility (this should be finished in summer 2008). This process of laboratory renovation is expected to continue during the life of the JDP.

The College is presently upgrading the computing services for all four departments. The main servers are being transferred to a dedicated, renovated room in the basement of the building. This move should improve maintenance capability and ensure computing capacity in the medium term. The computer labs within OCNG mentioned in C.1 above are being upgraded with new machines; this process is an ongoing one.
2. Describe availability and adequacy of existing facilities that will be used to support the proposed program.

The Department of OCNG at TAMU is housed in 7 floors of the 13-floor O&M Building on the College Station campus. State-of-the-art laboratories are available there because the OCNG Department has a long history of graduate student training and research. Additional laboratory facilities are available within the IODP building, within GERG, and on the Galveston campus. These may be used by students depending on their field of study. Office space for all faculty, staff and students taking part in the program is adequate for current needs.

3. Describe any planned renovation or alteration of existing facilities needed for the program. Estimate the date of availability. Display estimated cost in item VII.

None required (but see new facilities available above).

4. Describe any new facilities needed for the program. Estimate the date of availability. Display estimated cost in item VII.

No new facilities are needed for this program.

VII. COSTS

On the attached form, provide estimates of new costs to the institution related to the proposed program(s) and provide information regarding sources of the funding that would defray those costs.

The estimated direct cost of this program to the department is about $1.72M. This is more than compensated, however, by the associated funding. Students accepted into the program will be covered by a scholarship from the Chinese Scholarship Council that will provide funding for all living expenses, including medical insurance, at up to $2,000 per student per month. The only expenses not covered will be tuition at in-state rates* (~$8,000 per year), a one-time fee ($200) and the application fee ($75). The application fee will be paid by the Department of Oceanography. For the first three years of the program, tuition for the first year at TAMU will be split between the College of Geosciences and the Department of Oceanography (this is shown in the table above under scholarships in the cost side and reallocated funds/tuition on the funding side). In subsequent years, the TAMU co-chair of a student’s SAC will be responsible for tuition costs from research grants or other sources.

Administration, faculty and support staff costs are estimated as a percentage of present costs. Administration and staff costs are pro-rated as a percentage of total costs based on the number of graduate students served, and assuming that the program will lead to an overall increase of 25 students over the first five years. Faculty costs assume the need for up to three FTEs, based on 25 students each taking three courses per semester. In fact, no new faculty or staff are needed to run the program, and such staff costs will be covered from existing, reallocated funds. Similarly, no additional expenses are anticipated for facilities and equipment, or library costs.

* This assumes that the students are eligible for and compete successfully for competitive TAMU scholarships.
Travel costs include: the cost of TAMU administrators traveling to China each year to interview potential students, the cost to bring Chinese co-chairs to TAMU once during each student’s study period, and the cost for TAMU co-chairs to visit China for their students’ dissertation defenses. The TAMU co-chair will be responsible for his/her own travel costs and for funding visits by the Chinese co-chair as required. Again, research grant support is assumed here. The costs for the interview process will come from reallocated departmental funds, although it is anticipated that at least some of these costs also can be covered from research funds; research and administrative visits will be combined whenever possible to reduce these costs.

OUC will guarantee to cover costs of students enrolled in the program in the event that the program is not continued after the first five-year period (i.e., for those students who have not yet completed their degree work). Thus, the total cost to the department (at current rates) is about $8,200 per student per year. This compares with over $30,000 per student per year when students are recruited as GRAs or GATs.

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<th>5-YEAR COSTS</th>
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<th>Year 3</th>
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<td>Admin FTE</td>
<td>$19,575</td>
<td>$20,162</td>
<td>$20,767</td>
<td>$21,390</td>
<td>$22,032</td>
<td>$103,926</td>
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<tr>
<td>Faculty FTE</td>
<td>$51,160</td>
<td>$105,389</td>
<td>$180,917</td>
<td>$214,297</td>
<td>$287,903</td>
<td>$839,665</td>
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<tr>
<td>Support FTE</td>
<td>$5,225</td>
<td>$10,764</td>
<td>$13,858</td>
<td>$19,983</td>
<td>$23,523</td>
<td>$73,353</td>
</tr>
<tr>
<td><strong>Facilities, Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td><strong>Library, supplies, materials</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholarships</td>
<td>$41,375</td>
<td>$81,375</td>
<td>$121,375</td>
<td>$161,375</td>
<td>$201,375</td>
<td>$606,875</td>
</tr>
<tr>
<td>Travel - OUC faculty</td>
<td>$12,500</td>
<td>$12,875</td>
<td>$13,261</td>
<td>$13,659</td>
<td>$13,659</td>
<td>$52,295</td>
</tr>
<tr>
<td>Travel - TAMU admin faculty</td>
<td>$5,000</td>
<td>$5,150</td>
<td>$5,305</td>
<td>$5,464</td>
<td>$5,628</td>
<td>$26,546</td>
</tr>
<tr>
<td>Travel - TAMU faculty</td>
<td></td>
<td></td>
<td></td>
<td>$12,500</td>
<td>$12,891</td>
<td>$25,391</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td>$122,335</td>
<td>$235,340</td>
<td>$355,097</td>
<td>$448,270</td>
<td>$567,011</td>
<td>$1,728,051</td>
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</tbody>
</table>

**FIVE-YEAR SOURCES OF FUNDING**

<table>
<thead>
<tr>
<th>Reallocated funds</th>
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</thead>
<tbody>
<tr>
<td>Tuition/fees (dept/college)</td>
<td>$41,375</td>
<td>$41,375</td>
<td>$41,375</td>
<td>$375</td>
<td>$375</td>
<td>$124,875</td>
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<tr>
<td>Personnel</td>
<td>$75,960</td>
<td>$136,315</td>
<td>$215,542</td>
<td>$255,670</td>
<td>$333,458</td>
<td>$1,016,945</td>
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<tr>
<td>Travel</td>
<td>$5,000</td>
<td>$5,150</td>
<td>$5,305</td>
<td>$5,464</td>
<td>$5,628</td>
<td>$26,547</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$122,335</td>
<td>$182,840</td>
<td>$262,222</td>
<td>$261,509</td>
<td>$339,461</td>
<td>$1,168,367</td>
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<td>Special item funding</td>
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<td></td>
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<td></td>
<td>$0</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition (research grants)</td>
<td>$40,000</td>
<td>$80,000</td>
<td>$161,000</td>
<td>$201,000</td>
<td>$482,000</td>
<td></td>
</tr>
</tbody>
</table>
There are additional savings from this program that do not appear in the table. Because the students spend their first year in China, state support costs (formula funding) on a per capita basis are approximately 20% less than they would be otherwise (i.e., between $25,000 and $30,000 per year for each student cohort over the first five years). This provides an additional bonus and makes the program more attractive.

It is assumed that this program will lead to:

I. a regular supply of high-quality students for TAMU researchers;

II. support for students that will make TAMU more competitive in terms of grant applications;

III. research proposals to work with Chinese researchers around China; and

IV. access to Chinese ships and other facilities for TAMU researchers.
Appendix A. Memorandum of Agreement with OUC. Addendum to Supplement
Appendix B. Participating Graduate Faculty from TAMU (to be replaced by 2-page cvs)

Rainer Amon, Assistant Professor, Department of Marine Sciences, Texas A&M University at Galveston

Ayal Anis, Assistant Professor, Department of Marine Sciences, Texas A&M University at Galveston

Thomas Bianchi, Professor

Doug Biggs, Professor

Robin Brinkmeyer, Assistant Professor

David Brooks, Professor

Bill Bryant, Professor

Lisa Campbell, Professor

Ping Chang, Professor

Piers Chapman, Professor and Department Head

Timothy Dellapenna, Assistant Professor, Texas A&M University at Galveston

Steve DiMarco, Associate Professor

Wilford Gardner, Professor

Benjamin Giese, Associate Professor

Robert Hetland, Associate Professor

George Jackson, Professor

John Kessler, Assistant Professor

Patrick Loucouns, Associate Professor, Texas A&M University at Galveston

Mitch Lyle, Professor

Heath Mills, Assistant Professor

John Morse, Professor

Alejandro Orsi, Associate Professor

Antonietta Quigg, Assistant Professor, Texas A&M University at Galveston

Mary Jo Richardson, Regents Professor

Daniel Roelke, Associate Professor

Gilbert Rowe, Regents Professor, Texas A&M University at Galveston

William Sager, Professor

Peter Santschi, Professor, Texas A&M University at Galveston

Matthew Schmidt, Assistant Professor

Anya Schultz, Assistant Professor

Martha Scott, Associate Professor

Niall Slowey, Professor

Bob Stewart, Professor

Achim Stössel, Associate Professor

Debbie Thomas, Assistant Professor

Dan Thornton, Assistant Professor

Andrew Vastano, Professor

John Wormuth, Professor

Shari Yvon-Lewis, Assistant Professor
Appendix C. Participating Graduate Faculty from OUC (to be replaced by 2-page cvs)

Ge Chen, Professor of Information Science and Engineering-OUC
Xueen chen, Associate Professor
Zhenming Chi, Professor of Marine Life Science-OUC
Gang Fu, Professor of Meteorology-OUC
Huiwang Gao, Professor of Environmental Science and Engineering-OUC
Xiangzhong Gong, Associate Professor of College of Marine Life Sciences-OUC
Changlong Guan, Professor of Physical and Environmental Oceanography-OUC
Wensheng Jiang-OUC
Guangxue Li, Professor of Marine Geo-Science-OUC
Tie Li, Associate professor of Marine Chemistry in College of Chemistry and Chemical Engineering-OUC
Xiaopei Lin, Associate Professor
Sumei Liu, Professor of Marine Chemistry-OUC
Jilin Sun, Professor of Atmosphere Science
Houjie Wang, Associate Professor of College of Marine Geosciences-OUC
Qi Wang, Professor of Atmosphere Science
Zhenyu Wang, Professor of the College of Environmental Science and Engineering-OUC
Dexing Wu, Professor of College of Physical and Environmental Oceanography-OUC
Lixin Wu, Professor of Physical and Environmental Oceanography-OUC
Guanpin Yang, Professor of Marine Geo-Science-OUC
Guipeng Yang, Professor of Chemical and Chemistry Engineering-OUC
Zhigang Yu, Professor of Marine Chemistry-OUC
Shikui Zhai
Jinping Zhao, Professor of College of Physical and Environmental Oceanography-OUC
Dongliang Zhao, Professor of College of Physical and Environmental Oceanography-OUC