

2009-2010

*Hawai'i
Pacific
University*

College of Natural and
Computational Sciences



MSMS GRADUATE STUDENT HANDBOOK

An instruction manual for earning your Masters of Science in Marine Science degree at Hawai'i Pacific University



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Dean's Welcome

Aloha!

The College of Natural and Computational Sciences is pleased to welcome you to the Masters of Science in Marine Science Program at Hawai'i Pacific University.

The MSMS program was built upon our rigorous undergraduate marine science programs and our recent affiliation with the Oceanic Institute. This program is modeled on the traditional science graduate program consisting of a research-intensive training program where graduate students work side-by-side with their professors.

This graduate program is designed to prepare you for a vast array of careers armed with a solid understanding of marine science. At the same time, your activities enhance the depth and breadth of our college, attracting high quality faculty and students to all of our programs.

The information in this graduate handbook is intended to give you a full understanding of the diversity, depth and breadth of our program, as well as an appreciation of how we incorporate the rich and diverse flora and fauna of Hawai'i into our curriculum and learning experiences. HPU has a long history of being a student-centered university, and this program follows that philosophy.

Let me extend my personal invitation to each of you to come and visit with me. I am here for you if you need to see me.

E komo mai!

A handwritten signature in black ink, appearing to read "Andrew Brittain". The signature is written in a cursive style and is set against a light yellow rectangular background.

Dr. Andrew Brittain, Dean

Getting settled on O'ahu

State Identification

Those of you who are new to Hawaii may want to apply for a Hawai'i State Identification card. You may apply for the state ID upon your arrival to the islands. To apply please visit the Kekuanao'a Building in Honolulu located at:

465 S. King Street, Rm. 102
Honolulu, HI 96813

For information regarding required documents and procedure visit their website at:

http://hawaii.gov/ag/hcjdc/main/hawaii_id_cards/ or call (808) 587-3111.

Public Transportation

If you are planning on taking public transportation, you can find bus route maps and timetables at: www.thebus.org

You may also call (808) 848-5555 to speak with someone for this same information if you do not have internet access. You can typically find bus route maps and timetables available free at any library.

Housing information

For general information important to new graduate students such as housing options, getting around, etc. please visit: <http://www.hpu.edu/index.cfm?contentID=4596&siteID=1>

How things work at HPU

HPU Pipeline

Your school email account is through HPU's *Pipeline*. Pipeline also allows students to review their financial aid status, register for classes, review degree plans, check grades, and has links to many other student services. In addition, Pipeline gives access to WebCT which is used by instructors to post assignments, class reading materials, and other course related content.

To access your Pipeline account, visit: <http://campus.hpu.edu>

For help activating your Pipeline account and to get started, you may visit:

<http://www.hpu.edu/index.cfm?contentID=5945>

If you have any questions regarding Pipeline or are having technical difficulties, you may contact the HPU Pipeline Help Desk: Phone: (808) 566-2411 Email: cphelp@hpu.edu

Student Identification

MSMS graduate students will need an ID for both Hawaii Pacific University and the Oceanic Institute.

HPU Identification

The HPU UniCard is required for several student services, including access to computer centers and some library services.

To obtain an HPU ID, students must complete the registration process and have a valid picture ID.

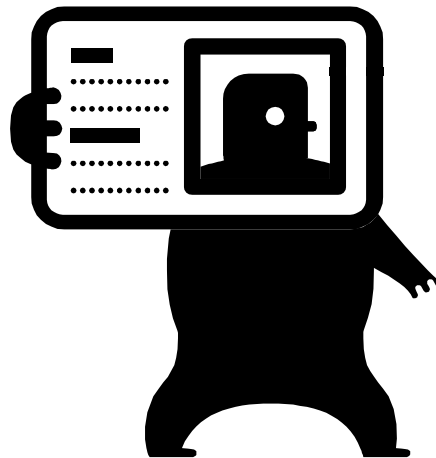
Two locations are available for students to obtain the HPU UniCard:

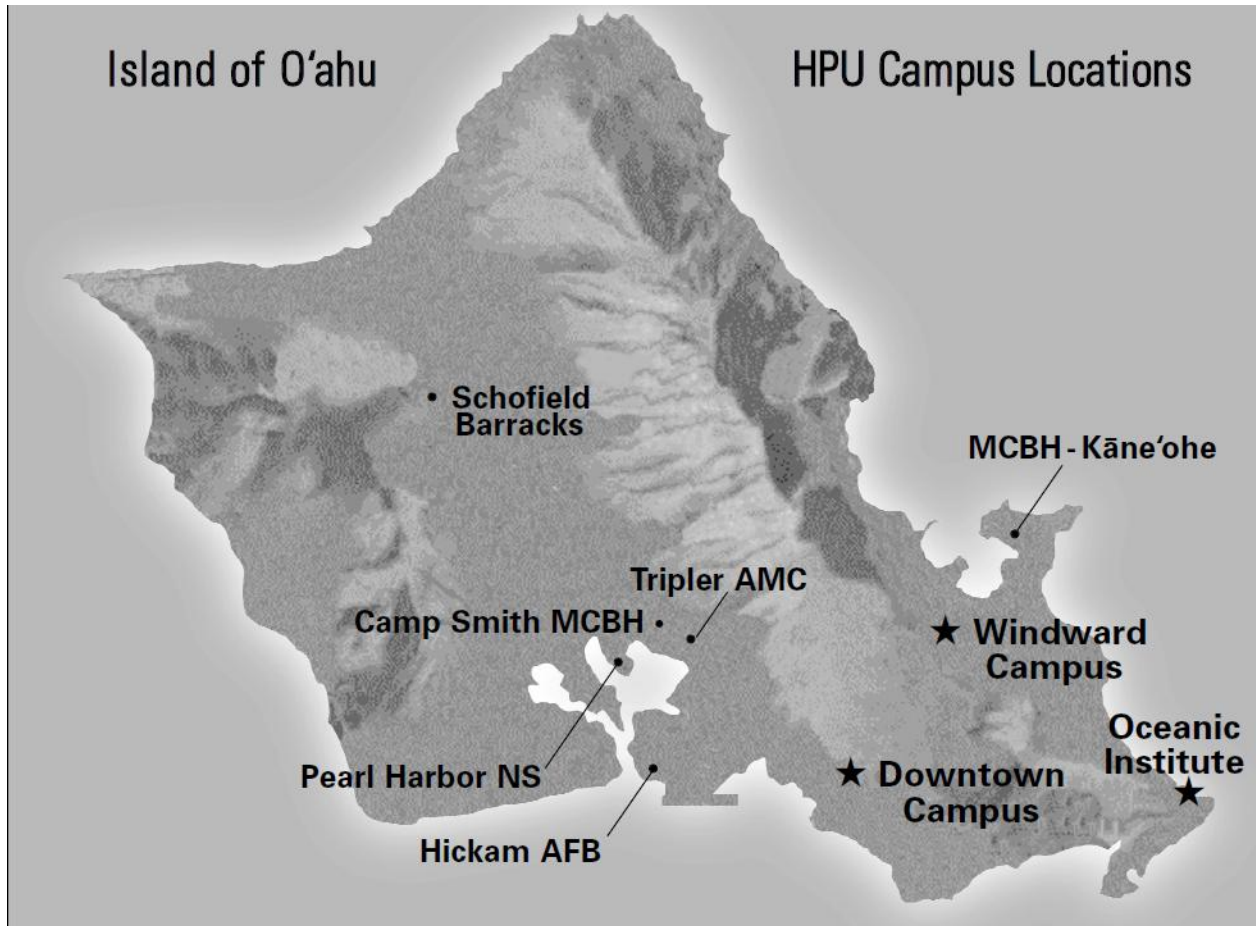
Downtown Campus - Learning Assistance Center - MP Building Room 139
Hawaii Loa Campus (Kaneohe) - Education Technology Center - AC Building 3rd Floor

OI Identification

Students will also need to obtain an Oceanic Institute ID badge. Students should contact Melissa Eyre to make an appointment to have their picture taken for the ID. She can be contacted by phone or email.

Phone: (808) 259-3112
Email: meyre@hpu.edu





Downtown Campus

1164 Bishop St.
Honolulu, HI 96813

Windward Campus (Hawaii Loa)

45-045 Kamehameha Hwy
Kaneohe, HI 96744

Oceanic Institute

41-202 Kalaniana'ole Hwy
Waimanalo, HI 96795

For campus maps and a virtual tour of HPU, visit

<http://virtualtour.hpu.edu/>

Traveling Between Campuses

Oceanic Institute to Windward - Hawaii Loa campus

Oceanic Institute in Waimanalo and the College of Natural and Computational Sciences at the Windward-Hawaii Loa campus in Kaneohe are roughly 10 miles apart. Driving between these campuses takes approximately 20 minutes by car, depending on traffic. Be prepared for a significantly longer travel time when taking the bus. Bus transfers may be required.

Oceanic Institute to Downtown campus

The distance between OI and HPU's downtown campus is approximately 17 miles. Travel by car is roughly 35 minutes or longer depending on traffic. If travelling by city bus, the travel time is around an hour and may require bus transfers.

Hawaii Loa to Downtown campus

The Downtown campus and Hawaii Loa are only 8 miles apart. This takes an average of 15 minutes to drive. This is also a fairly short city bus ride and no transfers are needed.

HPU offers a free university-operated shuttle service between these two campuses. Shuttles leave approximately every 15 minutes and every 30 minutes in the evening. Check HPU's website for shuttle schedules.

Parking

Hawaii Loa

There are several student parking lots as well as parallel parking on the Hawaii Loa campus. Daily parking rates and parking permits for the semester are available from the Hawaii Loa Bookstore. Check the bookstore for rates as well as required documents for the semester permit. They can be reached at (808) 236-3532.

Downtown

There are several commercial parking garages and parking lots available downtown. Prices between parking garages surrounding the downtown campus vary and students should compare rates.

Oceanic Institute

Free parking is available at OI. Unlimited parking is available at the Ocean Learning Center parking lot. Parking is also available for students at the OI/Sea Life Park parking lot near the OI administration building; students may park here in the unpaved, gravel area. The paved area is reserved for OI and Sea Life Park employees.

Thesis Research Requirements

Each graduate student must complete a research-based thesis project under the mentorship of a faculty member or researcher who also serves as their thesis committee chair. With the help of their thesis advisor, each student will come up with an original research question (hypothesis) and will develop a proposal for collecting and analyzing data to test the hypothesis. In addition to the thesis advisor, two additional faculty members whose fields of expertise complement that of the chair and the student's research topic also serve as thesis committee members.

The thesis advisor (committee chair) plays a key role in the education and training of MSMS students. The thesis advisor serves as the primary mentor in guiding the student in all aspects of the thesis research, preparation of the thesis proposal, performing analytical techniques in the laboratory and field, data analysis, and writing of the Masters thesis. The thesis advisor also convenes committee meetings and conducts evaluations of the student's performance. Other thesis committee members usually play a more supporting role, reading and evaluating the student's research proposal and thesis, and providing support and expertise in related theoretical and analytical disciplines.

Graduation Requirements

The MSMS degree requires the completion of 34 credits, consisting of core courses (9 credits), thesis research and course work (10 credits), and elective courses (15 credits). Students must perform substantial research, culminating in a significant written and oral report of this work presented to the entire college. Students must petition to graduate in the semester in which they expect to graduate (students finishing their program during a summer session may participate in the preceding spring semester graduation ceremony in May) and will submit the Petition to Graduate (PTG) form at the beginning of the term in which they plan to complete their degree requirements. Finishing students must be registered for at least 1 credit of NSCI 7000 in the term of their intended graduation date.

Graduate Committees

The "Nomination of Thesis Committee" form identifies a student's committee. The form must be signed by all committee members and turned into the Office of Marine Science Programs no later than December 1st for students entering in the fall and by May 1st for students entering in the spring. The appendix at the end of this handbook contains samples of the different forms that will need to be submitted by you to the Office of Marine Science Programs.

The committee will include a minimum of 3 members who hold a PhD in the sciences or a terminal degree in an appropriate discipline. Two HPU full-time faculty members or one HPU full-time faculty and one OI affiliate faculty must be on the committee. Committee membership requires approval by the Dean.

At least two committee members must be physically present at the thesis defense; one of those must be a HPU full-time faculty member. O.I. affiliate faculty members may chair thesis committees.

Thesis Proposal

Proposal Format

There is no program-wide required format for proposals and the formatting of thesis proposals is subject to the decision of individual committees. As such, it is important that the students discuss the proposal format with their advisors and committee members early on in the writing process, to ensure that all committee members agree with the structure of the proposal. Design of the thesis proposal is a major topic of the NSCI 6110 course series.

Proposal Defense

The proposal defense exam will involve a private presentation of the thesis proposal, followed by questioning by committee members to determine if the student has: 1) a thorough understanding of the literature pertinent to the proposed research, 2) clear and tractable questions/hypotheses, 3) appropriate methods and resources to complete the proposed research, 4) detailed plans for statistical analyses of data, and 5) a realistic timeline for completing the proposed research.

Public Presentation

The MSMS program hosts a symposium of graduate research before the fall semester. (This is typically the Thursday before classes start, during the Fall Semester Faculty Scholarship Day). MSMS students starting their second year are expected to give a short (15 – 20 minute) presentation about their projects. These presentations should summarize their proposed research and inform the audience of pertinent background information, research hypotheses, research plan and methods, and any expected outcomes. Most students will have defended their proposal before this event; however, it is not a pre-requisite for participation in the symposium.

Thesis

Thesis Format

Students should work closely with their advisors and committee members on the correct format for their research thesis. Once the complete thesis has been approved by the committee, the required thesis cover page will be signed by the faculty advisor, author, College Dean, and the Vice President of Academic Affairs.

Thesis Presentation

The thesis defense will be a public event open to HPU faculty and students, family members and friends. The presentation should be approximately 45 minutes, after which, the thesis committee will privately address the student. Locations and times for the thesis presentations will vary.

MSMS Course Requirements

Your faculty advisor (mentor) is your primary contact for academic advising. Together, you and your mentor will decide on a “degree plan” that best suits your area of interest and satisfies all program requirements.

Scholarship Recipients:

Students receiving HPU’s Trustee’s Scholarship 50% tuition waiver must carry a minimum of 6 credits each semester to remain eligible for this scholarship.

Core Courses (9 semester credits required)

Credit hours are given in parentheses

Students must take at least 3 of the following courses:

MARS 6050*	Marine Ecology (3)
MARS 6060	Geological Oceanography (3)
MARS 6070	Chemical Oceanography (3)
MARS 6080	Physical Oceanography (3)
MARS 6090*	Biological Oceanography (3)

* Students wishing to take MARS 6050 *and* MARS 6090 may use 3 credits toward the core requirements; the remaining 3 credits will be applied as elective credit.

Natural Science Courses (10 semester credits required)

A minimum of 6 semester credits of NSCI 6900 must be completed by graduation.

NSCI 6110	Graduate Seminar I – 1 st semester (1)
NSCI 6110	Graduate Seminar I – 2 nd semester (1)
NSCI 6120	Graduate Seminar II – 3 rd or 4 th semester (1)
NSCI 6900	Masters Research (1-3)
NSCI 7000	Thesis Capstone Course (1)

Elective Courses (15 semester credits required)

A maximum of 6 credits of advanced undergraduate courses (4000-level) can be taken as a graduate student. A maximum of 5 additional credits of *NSCI 6900 Masters Research* can be taken as electives. *Elective courses are chosen by each student in consultation with their graduate thesis committee.*

Advanced Undergraduate Courses

BIOL 4030	Cell and Molecular Biology (3)
BIOL 4031	Cell and Molecular Biology Laboratory (1)
BIOL 4040	Environmental Microbiology (3)
BIOL 4041	Environmental Microbiology Laboratory (1)
BIOL 4090	Biometry (3)
CHEM 4030	General Biochemistry I (3)
CHEM 4031	General Biochemistry I Laboratory (1)
CHEM 4032	General Biochemistry II (3)
CHEM 4033	General Biochemistry II Laboratory (1)
CHEM 4054	Aquatic Chemistry (3)
ENVS 4000	Methods of Environmental Science (3)
ENVS 4001	Methods of Environmental Science Laboratory (1)

ENVS	4050	Remote Sensing (3)
GEOG	4700	Geographic Information Systems (3)
MARS	4031	Marine Mammal Biology Laboratory (1)
MARS	4051	Marine Ecology Laboratory (2)

Graduate Courses

BIOL	6090	Advanced Biometry (3)
BIOL	6120	Ichthyology (3)
BIOL	6170	Larval Biology (3)
CHEM	6310	Marine Natural Products (3)
ED	6450	Science Curriculum and Instruction (3)
ED	6451	Science Curriculum and Instruction Field Experience (1)
ENVS	6200	Advanced Photovoltaic Systems Design (3)
ENVS	6920	Special Topics in Environmental Science (3)
GEOL	6010	Contaminant Hydrology (3)
MARS	6010	Toxicology and Stress Responses in Marine Communities (3)
MARS	6020	Marine Science Field Methods (3)
MARS	6030	Marine Mammal Biology (3)
MARS	6210	Coral Reef Ecology (3)
MARS	6920	Special Topics in Marine Science (1-3)
NSCI	6900	Masters Research (1-3)
PSGL	6500	Ecological Economics and Sustainable Development (3)

Course Descriptions

BIOL 4030 (3)

Cell and Molecular Biology

Principles governing metabolism, reproduction, genetics, and other aspects of biological activity at the cellular level in both prokaryotic and eukaryotic organisms.

BIOL 4031 (1)

Cell and Molecular Biology Laboratory

Laboratory component of BIOL 4030.

BIOL 4040 (3)

Environmental Microbiology

General microbiological principles emphasizing the nature of the microbial world, microbial metabolism, and energetics, microbial diversity, population interactions, human interactions. Emphasis is on the importance of micro-organisms in the biosphere.

BIOL 4041 (1)

Environmental Microbiology Laboratory

Laboratory component of BIOL 4040.

BIOL 4090 (3)

Biometry

Practical application of statistics to problems in marine, environmental and biomedical science, emphasizing critical thinking and problem solving using data sets from current research topics. The development of advanced skills in study design, describing and displaying data, analysis of variance, linear regression and correlation are augmented with computer software applications.

BIOL 6090 (3)

Advanced Biometry

Biometry II begins with a review of univariate inferential statistics and introduces multivariate methods including multivariate analysis of variance, principle components analysis, multidimensional scaling, and cluster analysis.

Graphical and tabular presentation of results and will be covered and students will analyze case studies provided by HPU graduate mentors. Analysis methods will be taught in the context of experimental design and hypothesis testing.

BIOL 6120 (3)

Ichthyology

Ichthyology is the study of fish biology. This course will cover areas of systematics, evolution, anatomy, physiology, behavior, ecology, biogeography, and conservation of fishes. This course will emphasize the incredible diversity of fishes and comparative study of

adaptations in relation to the environment, focusing on the marine habitat.

BIOL 6170 (3)

Larval Biology

Biology of embryos, larvae and juveniles of marine animals including freshwater species with marine larvae. Topics include life history differences, evolutionary transitions between developmental modes, parental investment, and dispersal, feeding, and settlement mechanisms. Methods of sampling, identification, culture and experimental study of common invertebrate and fish larvae will be emphasized.

CHEM 4030 (3)

Biochemistry I

Biochemistry delves into the chemical aspects of living organisms. This course is the first half of a two semester survey of this vast and growing field. The structure and function of biological macromolecules, with an emphasis on enzyme function and metabolism, will be examined. Topics to be covered include: nucleic acids, amino acids, proteins, carbohydrates, lipids, enzymes, metabolism and catabolism.

CHEM 4031 (1)

Biochemistry I Laboratory

This course is the first semester of a two-semester laboratory sequence in biochemistry. It serves as the laboratory component of the associated lecture course CHEM 4030. The emphasis is on proteins, enzyme kinetics, lipid membranes and use of primary literature. Biochemical laboratory techniques, such as spectrophotometry, gel electrophoresis, column chromatography and gas chromatography are employed.

CHEM 4032 (3)

Biochemistry II

This course is the second half of a two semester survey of the vast and growing field of biochemistry. The structure and function of biological macromolecules, with an emphasis on enzyme function and metabolism, will be examined. Topics to be covered include advanced metabolism and biosynthesis, DNA (replication, transcription and translation) and gene expression.

CHEM 4033 (1)

Biochemistry II Laboratory

This course is the second semester of a two-semester laboratory sequence in biochemistry. It serves as the laboratory component of the associated lecture course CHEM 4032. The emphasis is on DNA related techniques such as the polymerase chain reaction (PCR) and gel electrophoresis (DNA fingerprinting). Students also have the opportunity to carry out self-designed experiments and to report their results in a seminar format.

CHEM 4054 (3)

Aquatic Chemistry

Applications of chemical principles to describe processes controlling the composition of natural water systems.

CHEM 6310 (3)

Marine Natural Products Chemistry

Marine microbes, algae, and invertebrates are productive sources of structurally diverse, biologically active, and ecologically significant natural products. This course will cover the structures, biosyntheses, biological activities, isolation methods, and structure determination techniques for representative compounds from major structural classes including terpenoids, polyketides, alkaloids, and non-ribosomal peptides.

ENVS 4000 (3)

Methods of Environmental Science

This course will present advanced analytical technologies current in real world applications of environmental science. Computer-driven data analysis, modeling, and presentation technology has become vital to the understanding and reporting of problems and issues that constitute today's applications of environmental science. This course will present specific applications in a hands-on approach.

ENVS 4001 (1)

Methods of Environmental Science Laboratory

Laboratory component of ENVS 4000.

ENVS 4050 (3)

Remote Sensing

The physics and techniques of remote sensing presented through an exploration of physical characteristics of terrestrial and marine environments.

ENVS 6200 (3)

Advanced Photovoltaic Systems Design

This is an advanced course in photovoltaic systems designed for people considering a career in the solar electric industry. The detailed design of stand-alone and utility-interactive photovoltaic systems is covered with emphasis on compliance with the National Electric Code. Both residential and small commercial/institutional systems are covered (up to 30 kW). The course is based, in part, on the knowledge typically required of industry practitioners as specified by the North American Board of Certified Energy Practitioners (NACEP) and can help in preparation for the NBCEP PN installer certification exam.

ENVS 6920 (3)**Special Topics in Environmental Science**

The title, content and pre-requisites for this course will vary with instructor and need in the program. The course may be repeated when the title and content have changed.

An Introduction to ArcGIS Desktop Extensions

This course covers the concepts, technical issues, and applications of ArcGIS Desktop Extensions (Spatial Analyst, Geostatistical Analyst, 3D Analyst, Network Analyst, Image Analyst, and Stereo Analyst). Students will learn how ArcGIS Desktop Extensions fit in the world of information systems and mapping, how they are unique, and why they are important. Students will learn how to select and evaluate data, and implement and manage a GIS project in each of the ArcGIS Desktop Extensions. The technical language of GIS and ArcGIS Desktop Extensions will be explained. Students will gain practical experience using ArcGIS and the Desktop Extension's powerful and popular desktop GIS tools.

A Practical Guide to the National Environmental Policy Act (NEPA)

This class will provide practical training on the nuts and bolts of working with this far-reaching environmental law. The course will focus on case studies of federal actions requiring NEPA review and provides practical lessons that will help sharpen NEPA skills and the way one approaches some of the common problems EIS and EA preparers encounter.

GEOG 4700 (3)**Geographic Information Systems**

A course that provides students with the fundamental concepts underlying geographic information systems (GIS). The nature and analytical use of spatial information is discussed. During the laboratories, students acquire skills in utilizing the popular software package ArcView GIS. Laboratories provide hands-on experience with ArcView GIS.

GEOL 6010 (3)**Contaminant Hydrology**

This class will cover the theory and practical considerations of fate and transport of contaminants through porous geologic materials. Topics include: physical and chemical processes governing the transport of contaminants in groundwater; multiphase flow; chemistry of organic and inorganic contaminants; microbial degradation of contaminants; monitoring and remediation site characterization; remediation technologies; analytical and numerical models to simulate groundwater flow and contaminant transport.

MARS 4031 (1)**Marine Mammal Biology Lab**

This course aims to develop traditional laboratory, field, and computer skills to investigate marine mammal physiology and ecology. A broad range of topics will be covered including taxonomy, anatomy, population abundance and distribution, energetics, and marine mammal strandings. Data analyses and scientific writing of reports is emphasized.

MARS 4051 (2)**Marine Ecology Laboratory**

Laboratory and field component of MARS 6050.

MARS 6010 (3)**Toxicology and Stress Responses in Marine Communities**

Marine pollution is a problem that degrades habitat and exacerbates all other anthropogenic impacts to the marine environment. Using a case-study approach, this course explores 1) major types of marine pollution 2) the dynamics of specific classes of contaminants, 3) principles that influence toxicity of contaminants in major marine phyla, 4) diversity of metabolic and clearance mechanisms, and 5) impacts at the community and ecosystem levels.

MARS 6020 (3)**Marine Science Field Methods**

Marine Science Research will enable students to refine methodology for ship/boat-based research and to begin collecting data using HPU's marine resources. This course is required for students requesting Kaholo time for thesis projects.

MARS 6030 (3)**Marine Mammal Biology**

This course covers phylogeny, anatomy, physiology, ecology and behavior of marine mammals.

MARS 6050 (3)**Marine Ecology**

A graduate course emphasizing ecological interactions of marine organisms with their own and other species, and the physical environment. Designed to survey not only what is known about marine ecology, but how that knowledge was acquired, the course strongly emphasizes readings from original scientific literature.

MARS 6060 (3)**Geological Oceanography**

This course provides students with an in-depth survey of marine systems from a geological perspective. The topics covered will include the configuration of the ocean basins, paleo-oceanography, sea level change, oceanic sedimentary resources as well as sediment production, distribution and transport.

MARS 6070 (3)**Chemical Oceanography**

Chemical principles applied to the oceans. Fundamental topics include: biogeochemical cycles and their role in determining the chemical composition of seawater, chemical reactions in seawater, use of isotopes in ocean science, primary productivity, nutrient and carbon fluxes associated with primary productivity and the biological pump, atmospheric CO₂ concentrations, and ocean pH. Additional topics focus on contemporary issues in the oceans today (e.g. ocean acidification, contamination, eutrophication and hypoxia, and carbon sequestration) and on the use of chemical techniques and isotopes to infer past changes in ocean circulation, climate, atmospheric CO₂ concentrations, and ocean pH.

MARS 6080 (3)**Physical Oceanography**

An in-depth survey of marine systems from a physical perspective. Topics include physical and thermodynamic properties of seawater; temperature, salinity and density distributions, ocean heat budget, ocean effect on climate, geostrophic flow, Ekman balance, potential vorticity and Sverdrup balance, thermohaline circulation, waves, and tides.

MARS 6090 (3)**Biological Oceanography**

A survey of Biological Oceanography, with an emphasis on the interactions of organisms with the physical and chemical environment, and biogeochemical variability. This course offers an introduction to pelagic organisms and their functions (focusing on population genetics, energy flow and ecosystem models), spanning from the microbial loop to fisheries, with an emphasis on past and present global changes.

MARS 6210 (3)**Coral Reef Ecology**

Shallow, warm-water coral reef ecosystems are home to a fascinating diversity of organisms and an array of ecological processes that are easily observed and studied within a stone's throw from our local beaches. This course will cover the broad spectrum coral reef biology and ecology with a special emphasis on the reef ecosystem along the Hawaiian Archipelago. Topics will include the following: coral taxonomy, anatomy, biology, symbiosis, trophic ecology, biogeography, evolutionary history, paleoceanography of Hawaii, calcification and reef accretion, natural and anthropogenic disturbance, coral bleaching, global climate change, and ocean acidification.

MARS 6910 (1)**Current Topics in Marine Science Seminar**

Current topics seminars are designed to expose graduate students to new developments and discoveries in marine science by taking advantage of seminars and other educational opportunities inside and outside HPU. While this flexible structure may vary with instructor and topic, most will be structured as seminar courses. Students will be assigned readings in the current literature of the course topic and required to critique the readings and relate the materials to their own research or the instructor's area of expertise.

Biological Oceanography

Major topics in biological oceanography will be discussed using peer reviewed primary literature. Topics include: primary production, marine microbiology, zooplankton and secondary production, benthic habitats and communities, nutrient and particle fluxes associated with the oceans biological pump and with marine biogeochemical cycles. Weekly topics will be modified as necessary in response to the needs of the students.

Applications of Gas Chromatography-Mass Spectrometry (GC-MS)

This course will cover gas chromatography-mass spectrometry instrumentation and practical applications currently applied in industrial as well as research laboratories. Although this course is at the graduate level, fundamentals of analytical chemistry and quantitative chemistry will be reviewed. The basic theory of using GC-MS in separation, structural identification and quantitative analysis of biological and chemical samples will also be covered. The course is conducted as a series of lectures with hands-on practice of a newly-acquired GC-MS. Applications will center on using GC-MS in analyzing common organic compounds (e.g., lipids) and compounds of interest to the students in their research. To enhance interaction and active learning there will be special lab assignments in which students will individually demonstrate their understanding on applied examples.

Topics in Fisheries and Fisheries Oceanography

Overfishing is a major problem around the world. Understanding this issue requires understanding recruitment, physical-biological interactions, life-history characteristics, population dynamics, oceanography, climate change, management issues, economics, and international issues, to name a few. This seminar will examine an array of these topics through discussions of recent literature. Each week one student will guide a discussion based primarily on 1-2 papers. Studies from a wide array of fisheries and fisheries issues will be examined.

Spatial Management of the High-Seas: from Marine Protected Areas to Ocean Zoning

This seminar is designed to complement the concurrent *Marine Conservation Biology* course (MARS 6920), will review the conceptual and technological advances that have facilitated the design and implementation of Marine Protected Areas in the open ocean, and will look ahead towards the future developments in high-seas conservation. Students will read the scientific literature and discuss case studies designed to highlight the principles underlying the theory and practice of spatial management in the high-seas.

MARS 6920 (3)**Special Topics in Marine Science**

The specific title, content and pre-requisites for this course will vary with instructor and need in the program. The course may be repeated when the title and content have changed.

Deep Coral Reef Exploration

This course will cover the preparation, execution, and post-cruise data analyses for a 5 day scientific exploration of the deep-water, mesophotic coral reefs on the 223' research vessel *Ka'imikai-o-Kanaloa* with the Hawaii Undersea Research Laboratory (HURL). Students will participate in a project to investigate the impact of an invasive soft coral species (*Carijoa riisei*) on commercial stocks of black corals in Hawaii. Students will learn basic deep reef ecology, deep-water survey methods, and video analysis techniques; participate in a research cruise, observe remotely operated vehicle operations, and assist in processing deep-water samples; and help generate and analyze original research data resulting from the cruise. Students will write and submit a report based on their data.

Marine Megavertebrate Ecology & Conservation

This lecture and discussion course is designed to provide an overview of the ecology and behavior of large marine vertebrates, including bony fishes, sharks, sea turtles, seabirds, and marine mammals. This course will explore the response of these predators to oceanographic variability, their role in oceanic food webs, and the challenges associated with their management and conservation.

Marine Conservation Biology

Marine Conservation Biology is increasingly important for society, as evidenced by frequent media coverage and the recent reports by Pew and the U.S. Commission on Ocean Policy. This 3 credit course will cover a variety of topics pertaining to the conservation of marine biodiversity and living resources. The class will include lectures, library research, computer exercises, student-led debates and discussions of controversial issues. Students who take this class will be exposed to multiple perspectives on important conservation issues in the marine environment and will gain experience in critical thinking, communication skills, and the use of science in effective debate and decision making

Spatial Ecology

This is a workshop course, designed to provide students with a background overview and operational understanding of spatial statistics and their application in a variety of research fields. Students will learn statistical techniques available for quantifying spatial patterns in ecological data using uni-variate and multi-variate statistics. Computer labs and assignments will provide students with the quantitative tool-box necessary to analyze spatially-explicit datasets. Additionally, students will complete and present an independent research project, whereby they will use a variety of tools acquired in the class to analyze their own datasets. This course is a workshop designed to help students with their individual research projects and thesis research.

NSCI 6110 (1)

Graduate Seminar I-Thesis Proposal (this course is taken during both the fall and spring semester of the student's first year)

MSMS students attend scientific seminars at HPU or other venues as appropriate and present a seminar on their proposed thesis research. This course provides the framework for participatory learning of scientific research. The student will work closely with the instructor(s) to develop their own research proposal. During this course the student will perform the literature research required for the generation of a proposal for their laboratory or field research project required for the Masters program. The student will present this proposal to the college.

NCSI 6120 (1)

Graduate Seminar II-Thesis Presentation

MSMS students attend scientific seminars at HPU or other venues as appropriate, evaluate scientific presentation styles, practice presentation techniques, and present a seminar on their completed thesis research.

NSCI 6900 (1-3)

Masters Research

MSMS students do research towards their thesis under the supervision of a research mentor, contributing to the initial research proposal or to the Masters thesis. Variable credits.

NSCI 7000 (1-3)

MastersThesis

This course serves as a capstone course for the MSMS program. Students will work closely with their faculty advisor to improve their scientific writing skills. During this course students will develop a written thesis that describes their research in standard scientific format. Students are expected to enroll in this course after a majority of their thesis research is completed and as approved by the student's thesis committee. Variable credits.

PROJECTED GRADUATE COURSE SCHEDULE:

--courses may be modified based on demand.

Fall 2009 (odd years)			Spring 2010 (even years)		
MARS 6070	Chem Oc	Field	MARS 6080*	Phys Oc	Winn
MARS 6060*	Geol Oc	Fang	MARS 6090**	Biol Oc	Kahng, Field
MARS 6050**	Marine Ecol	Vetter	MARS 6020	Field Methods	TBA
NSCI 6110	Grad Sem I	Winn,Hyrenbach	NSCI 6110	Grad Sem I	TBA
NSCI 6120	Grad Sem II	Hyrenbach	NSCI 6120	Grad Sem II	TBA
NSCI 6900	Grad Research	various	NSCI 6900	Grad Research	various
NSCI 7000	Thesis	various	NSCI 7000	Thesis	various
MARS 6910-1	Fisheries Mngt	Field	MARS 6910-1	Climate change	Winn
MARS 6910-2	GCMS	Fang	MARS 6910-2	Marine Reserves	Hyrenbach
MARS 6010	Toxicology	Jensen	BIOL 4090+	Biometry	Vetter
ENVS 6920	Advanced GIS	Carstenn	BIOL 6170	Larval Biology	Unabia
			MARS 6920	Cons Bio	Hyrenbach
			ENVS 6200	Advanced Photovolt	Allen
			ENVS 6920	NEPA	Redpath

Fall 2010 (even years)			Spring 2011 (odd years)		
MARS 6070	Chem Oc	Field	MARS 6080	Phys Oc	Winn
MARS 6060	Geol Oc	Fang	MARS 6090	Biol Oc	Kahng,Field
MARS 6050	Marine Ecol	Vetter	MARS 6020	Field Methods	TBA
NSCI 6110	Grad Sem I	TBA	NSCI 6110	Grad Sem I	TBA
NSCI 6120	Grad Sem II	TBA	NSCI 6120	Grad Sem II	TBA
NSCI 6900	Grad Research	various	NSCI 6900	Grad Research	various
NSCI 7000	Thesis	various	NSCI 7000	Thesis	various
MARS 6910-1	Hot topic 1	TBA	MARS 6910-1	Hot topic 1	TBA
MARS 6910-2	Hot topic 2	TBA	MARS 6910-2	Hot topic 2	TBA
CHEM 6310	Marine Nat Prod	Horgen	MARS 6030	Marine Mammal Bio	West
MARS 6210	Coral Reef Ecol	Kahng	ENVS 6010	Wetlands	Carstenn
GEOL 6010	Contam Hydro	Fang	BIOL 6120	Ichthyology	Korsmeyer
			BIOL 4090	Biometry	Vetter

* indicates core course (need at least 3 of 4 disciplines)

**MARS 6050 or MARS 6090 satisfy biology core.

+ recommended undergraduate course

yellow: offered every year

blue: offered every semester

pink: every 2 years, or as needed

All graduate mentors are encouraged to lead a 1 credit seminar per year.

(NSCI 6110, 6120, or MARS 6910)

Sample schedules for a full-time MSMS student

Credit hours are given in parentheses (A total of 34 credits is required to complete program)

Sample 1:

Fall 1

MARS core	(3)
MARS core	(3)
NSCI 6110 Graduate Seminar I	(1)
NSCI 6900	(1)
Elective	(3)
Total	(11)

Spring 1

MARS core	(3)
Elective	(3)
Elective	(3)
NSCI 6900 Research	(1)
NSCI 6110 Graduate Seminar I	(1)
Total	(11)

Fall 2

Elective	(3)
Elective	(1)
NSCI 6900 Research	(2)
Total	(6)

Spring 2

NSCI 7000 Masters Thesis	(1)
NSCI 6120 Graduate Seminar II	(1)
NSCI 6900 Research	(4)
Total	(6)

Sample 2:

Fall 1

MARS core	(3)
MARS 6110 Graduate Seminar I	(1)
Elective	(3)
Elective	(1)
NSCI 6900 Research	(1)
Total	(9)

Spring 1

MARS core	(3)
Elective	(3)
NSCI 6110 Graduate Seminar I	(1)
NSCI 6900 Research	(1)
Elective	(1)
Total	(9)

Fall 2

MARS core	(3)
NSCI 6120 Graduate Seminar II	(1)
NSCI 6900 Research	(2)
Elective	(3)
Total	(9)

Spring 2

NSCI 6900 Research	(2)
Elective	(3)
Elective	(1)
Total	(6)

Summer 2

NSCI 7000 Masters Thesis	(1)
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Timeline:

1st Semester

Coursework

Discuss degree plan with your advisor and take a full load of courses (Refer to sample schedule)

Thesis Committee

Work with your advisor to choose committee members and form your committee

Research Topic

Identify your thesis research topic with the aid of your advisor

Read!

Begin reading literature relevant to your thesis topic

Literature Review

As part of NSCI 6110 Graduate Seminar I this semester, complete a literature review on research topic and explore proposal ideas

2nd Semester

Coursework

Continue taking a full load of courses. You might complete the core courses in this semester

Proposal

Complete your thesis proposal this semester in NSCI 6110 Graduate Seminar I and submit proposal for committee review

If committee finds the proposal unsatisfactory, they may choose to

- (1) Dismiss the student from the graduate program
- (2) Allow an additional semester or summer to revise the proposal

Research

Begin working on thesis research

Proposal Defense

Schedule proposal defense with committee members

Summer I

TIME TO GET BUSY WITH RESEARCH!!!

The majority of research is conducted in the summer following the successful submission of the research proposal

Public Seminar

The week before school starts...

Give a presentation about your research in a public seminar on Faculty Scholarship Day

3rd Semester

Coursework

Continue taking courses, wrap up degree requirements

Research

Keep up the research work!

4th Semester

File Petition to Graduate

A sample of the *Petition to Graduate* Form can be found on the last page of the Appendix at the end of this document

1. Student completes the form and forwards to their faculty advisor to sign.
2. The faculty advisor's signature confirms that the student has completed the program to their satisfaction and has met the program requirements. Please contact Melissa for a copy of the student's "degree plan" which shows all of the courses taken by the student during the length of their program.
3. Attach a copy of the degree plan to the signed PTG and forward to CNCS Dean for signature.
4. After Dean's signature is obtained return to Melissa Eyre for forwarding to MSMS Advisor Shirley Zhuang.

When submitting the PTG please be aware of the submission deadline so that it arrives in Shirley's office on time. The form needs to be reviewed by CGAS, the Financial Aids Office, and the Registrar's office before a student can participate in the graduation ceremony.

THERE IS A \$130 FILING FEE FOR THE PTG. THIS FEE MAY BE PAID ONLINE OR A CHECK MAY BE ATTACHED TO THE PTG.

Coursework and Research

All courses and required credits should be completed in this semester

Wrap up research

Thesis

Writing your thesis should be a top priority

By **mid-semester** you should submit a draft of the thesis to your committee

Once the committee has accepted the draft, the student may schedule the thesis defense

Defense

Time to defend again!

Present and defend your thesis to the public and your committee members

You must defend at least one week before grades are due for the term to allow time for any changes that may need to be made to your thesis

Final draft acceptance by the Graduate Program



MSMS Ombudsman

From time to time, issues can arise between students and faculty members. We always recommend that the parties involved in a misunderstanding or conflict try to resolve issues together in an open and honest manner. In the event that a conflict cannot be resolved in a timely manner, we strongly encourage you to seek help from the MSMS Ombudsman. An ombudsman is a person who acts as an intermediary between parties involved in a conflict, can represent the interests of both parties, abides by all requests of confidentiality, and acts toward the goal of resolving conflicts that can interfere with progress toward your degree.

Dr. Brenda Jensen, MSMS Program Chair, is the official ombudsman for the MSMS program. If for some reason you feel that you cannot approach Dr. Jensen with your issue, please contact Mr. Peter Greene (Department Chair, Natural Sciences) or Dr. Chris Winn (Associate Professor of Marine Science).

Important Contact Information

MSMS Program

MSMS Program Administration

Melissa Eyre meyre@hpu.edu
(808) 259-3112 or from an HPU/OI phone ext. 73112

Associate Dean, CNCS, MSMS Program Chair, Ombudsman

Dr. Brenda Jensen bjensen@hpu.edu
(808) 236-3533

College of Natural and Computational Sciences (808) 236-5854

The offices for the College of Natural and Computational Sciences are located on the Hawaii Loa campus.

Dean: Dr. Andrew Brittain abrittain@hpu.edu
(808) 236-5853

Oceanic Institute Security (24/7) (808) 220-2899

Whenever dialing an outside telephone number from an OI phone you must dial "9" first.

Please contact security when you are staying past normal business hours (after 6P) or when coming in on the weekends. Security will stop to investigate if they see lights or other activity and are unaware that students are working.

Graduate student office at Oceanic Institute "dorm" building: (808) 259-3125, ext. 17125

Graduate student office at Oceanic Institute 201 Brittingham building: (808) 259-3113, ext. 73113

Winn lab at Oceanic Institute Brittingham 202: from OI phone, ext. 17213

Jensen lab at Oceanic Institute Brittingham 203: from OI phone, ext. 17214

Hawaii Pacific University

HPU Financial Aid Office: (808) 544-0253

HPU Center for Graduate and Adult Services (CGAS) (a.k.a. the graduate office or graduate admissions): (808) 543-8034

MSMS Academic Advisor (CGAS): Shirley Zhuang szhuang@hpu.edu. When contacting the MSMS Academic Advisor, please include your student ID number, full name, and mention that you are in the MSMS program.

Atherton Library (Hawaii Loa campus) (808) 236-3505

Advise from students...



Get coursework out of the way as soon as possible – dedicate most of your last year to thesis writing

Attend student / faculty get-togethers – it helps you get to know your fellow students and professors better when you see them in social situations

...in general

Begin reading scientific papers early!

Become friendly with other graduate students – you have no idea how much this helps!

Talk to students who have previously taken courses you are considering – they may have good insight into class structure and what the course is really like

Spend as much time in your office as possible – you'd be amazed how much more work you get done than when you leave after classes

...about your advisor and Thesis Committee

Keep in touch with your advisor before school even begins – start to talk about research options and forming a plan for coursework before you arrive

Talk with your advisor right away about their expectations for you and your expectations for them – ex: contact hours per week, check-in dates, how you will progress, etc.

Check-in with your advisor weekly to make sure you are on track – ask for any recommendations they have for your progress

Try to hold a committee meeting once a month to keep your committee informed and on the same page – this can save time later

Have alternative or back-up projects!!!

Some projects are high risk or do not work out how you had planned – it is important to have alternative research in mind

Have your advisor review your undergraduate background – what should you already know? Are up to speed? If not, what can you do to bring yourself up to where you should be?

...about research

Understand where your funding comes from and how everything works – are there any stipulations to the funding? Could you lose the funding? What will the money cover?

Look into all funding options and discuss with your committee

Ex: scholarships, grants, etc.

Talk with your committee if you don't like the direction your research is taking and have ideas about how you would like to change it

Talk with your advisors immediately about possible research projects and funding – begin to formulate a research plan as soon as possible!

Set a research plan early!

Make sure funding is in place, that the project can run smoothly, set a reasonable timeline

Appendix: *Forms required during the course of your program:*

NOMINATION OF THESIS COMMITTEE

Date: _____

Print Full Name (Last, First, Middle)

Student ID Number

Address

City, State, ZIP

(Area Code) Telephone

Email Address

Title of Thesis:

Advisor (Print) Date

Telephone Email

Brenda Jensen, Associate Dean, CNCS (Signature) Date

Telephone Email

Nominated Committee

Name and Rank (or Title)	Program/Department/Place of Employment
Advisor and Committee Chair: (Print Name then Sign)	
2 nd member (Print Name then Sign)	
3 rd member (Print Name then Sign)	
Additional member optional: (Print Name then Sign)	

The Committee must consist of a minimum of three members, at least two of whom must be Regular Members of the HPU CNCS Faculty and hold full-time appointments. The Chair of the Committee is the student's advisor, who must be a Regular Member of the CNCS Faculty, or, has received special permission obtained by endorsement by the Graduate Program Committee and ratification by the Dean of the CNCS. Upon nomination by the Chair of the student's Thesis Committee and approval by the Dean of the CNCS, individuals who are not Regular Members of the HPU CNCS Faculty may serve on the Thesis Committees.

Approved Disapproved

Andrew Brittain, Dean, College of Natural and Computational Sciences (sign and date)



Hawaii Pacific University
College of Natural and Computational Sciences

Thesis Proposal Defense Form/Proposal Approval Form

Student name:
Presented his/her thesis entitled:
On (date):
It is the determination of the Examining Committee that the student's proposal is: (circle one) Acceptable Unacceptable
Faculty Advisor (Print NAME and TITLE): Signature: Date:
Committee Member (Print NAME and TITLE):
Committee Member (Print NAME and TITLE)
Committee Member (Print NAME and TITLE)
Submit this form to Melissa Eyre - Office of Marine Science Programs at Oceanic Institute
NOTE: This <i>MSMS Tracking Form</i> is submitted after the student's committee has approved the proposal. The form is available in the Office of Marine Science Programs. The original form will be placed in the student's file.

Thesis cover page

[Thesis Title]

[Full Legal Name of Author]

Hawai'i Pacific University

Masters of Science in Marine Science Program
College of Natural and Computational Sciences

Approved for distribution by:

Name of Dean of the College of Natural and Computational Sciences _____

Signature _____

Date _____

Name of Vice President of Academic
Affairs _____ Signature _____

Date _____

HAWAI'I PACIFIC UNIVERSITY

This is to certify that I have examined this copy of a Masters thesis by:

(Full Legal Name of Author)

submitted in partial fulfillment of the requirements for the degree of Masters of Science in Marine Science at Hawaii Pacific University and have found that it is complete and satisfactory in all respects, and that any and all revisions required by the final examining committee have been made.

Name of Faculty Advisor _____

Signature of Faculty Advisor _____

Date _____

Signature of Author _____ Date _____

HAWAII PACIFIC UNIVERSITY
 1164 BISHOP STREET, SUITE 218
 HONOLULU, HAWAII 96813-2882
 PHONE: (808) 544-0239

**PETITION TO GRADUATE
 (GRADUATION APPLICATION)**



OFFICE USE ONLY	
DATE RECEIVED	_____
RECEIPT NUMBER	_____
HONORS ESTIMATE	_____

CURRENT ADDRESS:

Copy will be returned to you in a window envelope; type or print address clearly.

Family Name	First	Middle
Street	Apt. No.	
City	State	ZIP Code

Student No. @ _____
 Home Phone _____
 Work Phone _____
 E-mail _____
 CAMPUS: Downtown - Honolulu Hawai'i Loa - Kane'ohe
 Military Campus _____ Branch _____ Pay grade _____
 Advisor _____

Address to mail diploma,* if different from the address given above:

NAME _____
 STREET _____
 CITY/STATE/ZIP _____
 COUNTRY _____

* Diplomas are mailed approximately two months after you finish your last class(es).

I plan to complete degree requirements: _____ MONTH _____ YEAR
 I plan to attend the ceremony: January, 20____ May, 20____
 I do not plan to attend the ceremony.

NAME ON DIPLOMA AND COMMENCEMENT PROGRAM: Please use the space below to type or clearly print the correct order (first, middle, last) of your legal name for diploma and commencement program:

LEGAL NAME HERE

DEGREE INFORMATION: The degree I am completing is (check one only, complete another portion if you are petitioning for more than one degree)

- Associate in Supervisory Leadership
- Associate of Science in _____
- Associate of Arts in _____
- Bachelor of Science in Business Administration
 Major(s) _____
- Bachelor of Arts, Major(s) _____
- Bachelor of Science in Nursing
- Bachelor of Science, Major(s) _____
- Bachelor of Social Work
- Master of Business Administration
 Concentration(s) _____
- Master of Education
- Master of Social Work
- Master of Arts in _____
- Master of Science in _____
- Minor attached to Bachelor degree _____

Semester/Term you plan to finish your last course(s) _____ / _____
(month) (year)

Check Appropriate Boxes:

I am enrolled in the following course(s) in the _____ Term/Semester, 20____

1. _____	4. _____
2. _____	5. _____
3. _____	6. _____

In addition to the courses listed above, I need a passing grade in the following courses:
 Course _____ Term _____

I have already completed all requirements for the degree as of _____ (month/year)

STUDENT SIGNATURE _____ DATE _____

REQUIRED APPROVALS FOR COMPLETION	FINANCIAL AID	<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED	COMMENTS: _____ Signature _____ Date _____
	ADVISOR	<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED	COMMENTS: _____ Signature _____ Date _____
	ACADEMIC/GRADUATE DEAN	<input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED	COMMENTS: _____ Signature _____ Date _____

Rev. 4/09

DEGREE PROCESSING FEE: \$130.00. (PLEASE SUBMIT PAYMENT WITH APPLICATION).
 DIPLOMAS WILL NOT BE RELEASED TO STUDENTS WHO HAVE FINANCIAL OBLIGATIONS TO HPU.