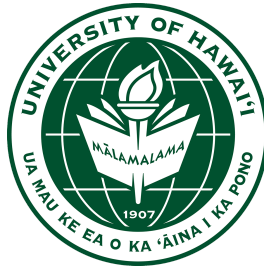


**Department of Natural Resources and Environmental Management (NREM)
College of Tropical Agriculture and Human Resources (CTAHR)
University of Hawai'i at Mānoa**



NREM Graduate Student Guide

AUGUST 2021

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WELCOME TO NREM

This document is meant to help guide you in your academic journey in NREM, and facilitates the advising of NREM's incoming and continuing graduate students. You should read the entire document and refer to it regularly. Your advisor will help you, but ultimately you are responsible for navigating your academic journey. The information presented here expands upon the NREM academic program description in the UHM catalog. These guidelines are intended to supplement information on our NREM graduate webpage (<https://cms.ctahr.hawaii.edu/nrem/GRADUATE>). The UHM Graduate Division website (<http://www.manoa.hawaii.edu/graduate/>) contains further policy information. Graduate Division has final say over any university-level policies, which change from time to time, so it is a good idea to refer to the website regularly.

The NREM graduate program brings together natural and social scientists to offer an integrative and interdisciplinary program to understand and manage tropical and sub-tropical terrestrial and aquatic ecosystems. Emphasis is placed on island settings and their relevance to managing land- and seascapes. The NREM curriculum emphasizes the application of physical, biological, spatial, and social sciences to the conservation and sustainable management of natural, environmental, and economic resources. The program also provides a science-based foundation to assess the processes that control the structure and function of terrestrial and aquatic ecosystems, and the human behaviors and policies that impact those processes. Studies in NREM incorporate the various components and scales (spatial and temporal) that determine ecosystem structure and function, and that bear upon the social and economic welfare of residents in diverse communities and environmental settings.

Students are expected to acquire quantitative reasoning, critical thinking, and advanced analytical and professional skills that enable them to solve contemporary resource use and environmental problems and to assist in sound policy development and implementation. NREM graduates should be skilled in addressing natural resources and environmental policy and management issues of the competing needs of diverse clientele and communities. NREM graduates are expected to serve as professional leaders in natural resources and environmental management and policy, academic teaching and research, and applied research and extension in educational and governmental institutions, international, national and state technical assistance and policy agencies, agricultural and forestry industries, consulting firms, and private nonprofit and non-governmental organizations.

PROGRAM STUDENT LEARNING OUTCOMES

NREM is an interdisciplinary department that offers an integrative graduate curriculum necessary for quality decision-making and solution-oriented natural resource and environmental management. As a foundation for graduate training, all NREM students are expected to acquire a common base of knowledge embodied in a set of core courses. Beyond that, students are expected to develop knowledge and skills within a chosen specialization area. This helps to ensure that students have the real-world skills needed to perform specific tasks, analyze resource management and policy issues, carry out original research, and effectively perform outreach and educational activities.

The NREM program's curriculum is designed for the students to achieve the following learning outcomes:

1. Students demonstrate knowledge of social and ecological principles, and interdisciplinary aspects of natural resource and environmental management issues
2. Students can analyze and address natural resource and environmental management problems by using appropriate methods from social and/or natural science disciplines
3. Students communicate effectively, both orally and in writing, to diverse audiences including professionals, resource managers, local communities and policy makers
4. Students can
 - Conduct original, independent scientific research of professional quality in their specialization area (Ph.D.)
 - Conduct scientific research of professional quality in their specialization area (M.S. Plan A and C)
 - Conduct a capstone project of professional quality to acquire practical experience by applying NREM knowledge (MEM)
5. Students can function as professionals by demonstrating responsible and ethical conduct, effective collaboration, informed decision making, and life-long learning.

NREM FACULTY AND STAFF

GRADUATE PROGRAM COMMITTEE

Graduate chair (please direct all inquiries to this email):

E-mail: nremgrad@hawaii.edu

Members:

Dr. Susan Crow, Chair (pending faculty vote and approval)

Office: Sherman 132

E-mail: crows@hawaii.edu

Dr. Catherine Chan

Office: Sherman 224

E-mail: chanhalb@hawaii.edu

Dr. Yinphan Tsang

Office: Sherman 243

E-mail: tsangy@hawaii.edu

REGULAR NREM FACULTY

(* = Graduate Faculty)

- *C. Chan, PhD - US and international natural resources and environmental policy and agricultural development
- *S. E. Crow, PhD—Soil ecology and biogeochemistry
- C. I. Evensen, PhD (Emeritus status pending)—Natural resource management, environmental quality
- *J. B. Friday, PhD—Tropical forestry/agroforestry extension
- *T. W. Idol, PhD—Tropical forestry/agroforestry
- M. Kaneshiro, PhD – Coastal Ecology
- *C. Litton, PhD—Terrestrial ecosystem ecology, biogeochemistry
- *T. Miura, PhD—Geospatial analysis, remote sensing
- *K. L. L. Oleson, PhD—Ecosystem service modeling and valuation, policy analysis, decision analysis
- *M. R. Price, PhD—Conservation ecology, community-based conservation, population genetics, geographic information systems, landscape genetics
- S. Sand, MS – Agricultural finance
- *P. C. Trauernicht, PhD—Wildland fire management and climate change
- *Y. P. Tsang, PhD— Ecohydrology, hydrological modeling, landscape ecology

*M. Vaughan, PhD—Eco-cultural restoration, community-based management, environmental ('āina based) education
P. Garrod, PhD (Emeritus)—Production economics
L. J. Cox, PhD (Emeritus)—Community economic development
C. Gopalakrishnan, PhD (Emeritus)—Water policy and resource economics
S. El-Swaify, PhD (Emeritus) – Soil Science
P. Leung, PhD (Emeritus)—Fisheries economics
J. F. Yanagida, PhD (Emeritus)—Production economics, price analysis, international trade

COOPERATING NREM GRADUATE FACULTY

**Note cooperating faculty cannot chair MEM, MS or PhD committees in NREM*

L. Bremer, PhD—ecosystem services, social-ecological systems, watershed management and conservation, land-use change, water resources (UHERO)
K. Burnett, PhD (UHERO)—Invasive species assessment and management
J. Cusick (WRRC)—Environmental history, environmental education, protected area politics, ecotourism
J. Deenik, PhD (TPSS)—Soil fertility and quality
J. DeFrank, PhD (TPSS)—Herbicide management
A. El-Kadi, PhD (G&G/CEE)—Groundwater hydrology
T. Giambelluca, PhD (GEOG)—Climatology, hydrology
S. Honarvar, PhD (Botany PCSU)—Wildlife management
N. V. Hue, PhD (TPSS)—Organic cycling
Q. Li, PhD (MBBE)—Environmental chemistry
Y. Li, PhD (UH Hilo)—Forest ecosystem management
N. Lincoln (TPSS)—Indigenous Crops and Cropping Systems
A. Mawyer, PhD (Center for Pacific Island Studies)—Anthropology, sense of place, psychology, filmmaking
A. Miles, PhD (UH West Oahu)—Sustainable agricultural systems
C. Nelson, PhD (SOEST)—Ecology, evolution, marine biology
T. Radovich, PhD (TPSS)—Organic and sustainable farming
H. Valenzuela, PhD (PEPS)—Vegetation physiology and management
K. Winter, PhD (He'eia NERR) —Hawaiian ethnobotany, native ecosystem restoration, ahupuaa models, integrated mauka to makai local level resource management
R. Zahawi, PhD (Lyon Arboretum)—Plant biology

AFFILIATE NREM GRADUATE FACULTY

G. Bruland, PhD (Principia College)—Soil and water conservation
K. Carlson, PhD (New York University)—Land systems service

L. Crampton, PhD (DOFAW, DLNR)—Kauai Forest Bird Recovery project
J. Fox, PhD (East-West Center)—Social forestry
A. Friedlander, PhD (USGS CRU)—Fisheries ecology
C. Giardina, PhD (IPIF - USDA-FS)—Forest ecology
T. Grabowski, PhD (UH Hilo)—Fisheries ecology
S. Gray, PhD (Michigan State U)—Human ecology
S. Hess, PhD (USGS)—Wildlife management
D. Jacobs, PhD (Purdue U)—Regeneration of planted and natural forests, restoration ecology, tree physiology
J. J. K. Leary, PhD (University of Florida) —Invasive species control
K. Leong, PhD (NOAA)—Environmental social science, human dimensions
C. Lepczyk, PhD (Auburn U)—Ecosystem management, wildlife ecology, landscape ecology
J. Lynch, PhD (National Institute of Standards & Technology, Hollings Marine Laboratory)—Marine environmental science
R. Mackenzie, PhD (USDA Forest Service)—Aquatic ecology
H. McMillen, PhD (US Forest Service, Northern Research Station) Community-based natural resource management, social-ecological systems, and global change
M. Pan, PhD (NOAA Fisheries)—Fishery economics
S. Pooley, PhD (retired NOAA-NMFS)—Marine resource economics
C. Ray, PhD (U of Nebraska-Lincoln)—ground water hydrology and chemistry
R. Ryals, PhD (U of California, Merced)—Agricultural ecosystem ecology
D. Spatz, PhD (Pacific Rim Conservation)—Island and coastal marine conservation science
A. Strauch, PhD (Commission on Water Resource Management, State Dept. of Land & Natural Resources)—Watershed hydrology
A. Vorsino, PhD (USFWS)—native and invasive species biology and habitat conservation
S. Wongbursarakum, PhD (FAME)—Coastal fisheries
M. Weijerman, PhD (JIMAR)—Tropical marine ecology and coastal management
K. Winter, PhD (He'eia National Estuary Research Reserve)—Hawaiian ethno-botany, native ecosystem restoration, ahupua'a models, and integrated mauka to makai local level resource management
L. Young, PhD (Pacific Rim Conservation)—Seabird conservation

NREM FRONT OFFICE STAFF

General assistance, nrem@hawaii.edu; 808-956-7530

Personnel, Lisa Kam—lisakam@hawaii.edu, 808-956-2150

Fiscal, nremfis@hawaii.edu

ADMISSION

QUALIFICATIONS

ADMISSION TO NREM

Master's program applicants (MEM, M.S. Plans A & C) must possess a Bachelor's degree. Ph.D. applicants generally possess a Master's degree or have exemplary academic credentials (see "Admission to PhD from BS/BA" below). In addition, individuals should meet minimum requirements necessary to gain admission to the [UH Mānoa Graduate Division](#).

- Applicants must have satisfactorily completed, or plan to complete, coursework equivalent to [NREM 203](#) (Applied Calculus), [NREM 310](#) (Statistics), [NREM 220](#) (Agricultural and Resource Economics), [CHEM 161](#) (Chemistry), and [BIOL 171](#) (Biology) or Ecology. Applicants deficient in these areas will be required to make up appropriate coursework promptly following admittance to UHM/NREM;
- Expected minimum GRE score of 302-308 combined Verbal and Quantitative Reasoning (equivalent to 1,100-1,200 on the prior scale);
- A well-written objective statement for pursuing a degree in NREM;
- Three (3) strong recommendation letters

ADMISSION TO MS PLAN C

Note: the MS Plan C program will be revised for AY 2021-2022 and is not active at this time

The Plan C degree program is available only to individuals with exceptional prior work experience, defined as at least five years of post-undergraduate relevant work experience in natural resources and environmental management. These may include but are not limited to environmental policy, research, education, planning, extension, non-profit directorships, and management. Although not all experience need be in one job or one field, the applicant must have at least three years of post-entry-level positions. Experience may include up to two years of year-long internships, such as KUPU, AmeriCorps, or Peace Corps. Normally, volunteer work and undergraduate coursework will not be considered as part of the minimum relevant work experience. Work experience that is unrelated or tangential to natural resources and environmental management and related fields does not qualify as relevant work experience. Before enrolling in the program, students must complete coursework equivalent to NREM 203 (calculus), NREM 310 (statistics), NREM 220 (economics), CHEM 161 (chemistry), and BIOL 171 (biology). They must also meet the minimum requirements of the [NREM graduate program](#) and the [University of Hawai'i Mānoa Graduate Division](#).

Plan C applicants should submit all documents required for admission to the [NREM graduate program](#), including application to University of Hawai'i at Mānoa [Graduate Division](#). In their objective statement, prospective students should describe how their work experience qualifies as “exceptional”, considering the criteria listed in the *Qualifications* section above. In addition to these application materials, Plan C applicants should also submit a Program Plan. The Program Plan includes a proposed timeline, a course list for a minimum of 6 credits of elective coursework, a capstone project proposal, and a description of how completion of the proposed Program Plan will support the applicant’s future career goals. The Program Plan should be developed in consultation with and approved by a member of the regular [NREM graduate faculty](#), who must also agree to serve as the primary advisor for the student.

ADMISSION TO PHD FROM BS/BA

A student with only a BS/BA degree can be admitted directly into NREM’s PhD program if ALL of the following criteria are met:

1. A faculty member agrees to advise the student and commits to at least three years of funding
2. The student has a record of excellent academic achievement including, at a minimum:
 - a. Undergraduate GPA >3.5
 - b. Average verbal, quantitative, and written GRE scores >75th percentile
3. The student has the proven ability to undertake independent research, which is demonstrated by successfully completing ALL THREE of the following:
 - a. Authored/co-authored (student as 1st author) a minimum of one presentation at a national or international professional conference
 - b. Authored/co-authored (student as 1st author) a minimum of one **peer-reviewed** article that is “*in press*” after being accepted for publication in a reputable refereed journal or reviewed edited book
 - c. Accrued at least two years of meaningful research experience at school, jobs, or internships
4. Acceptance by graduate division

ADMISSION TO PHD WITHOUT FINISHING NREM MS OR MEM

A currently enrolled NREM MS or MEM student can be admitted into NREM’s PhD program prior to completing their MS or MEM degree if ALL the following criteria are met:

1. Unanimous approval by the student’s MS or MEM committee
2. Record of excellent academic achievement including, at a minimum maintaining a GPA >3.5 in the MS or MEM NREM program

3. The student has the proven ability to undertake independent research, which can be demonstrated by successfully completing ALL THREE of the following:
 - a. Authored/co-authored (student as 1st author) a minimum of one presentation at a national or international professional conference
 - b. Authored/co-authored (student as 1st author) a minimum of one **peer-reviewed** article that is “*in press*” after being accepted for publication in a reputable refereed journal or reviewed edited book
 - c. Accrued at least two years of meaningful research experience at school, jobs, or internships
4. Acceptance by graduate division

ADMISSION TO NREM MS PLAN A FROM NREM MEM

A currently enrolled MEM student can be admitted into NREM’s MS Plan A program prior to completing their MEM degree if ALL the following criteria are met:

- The student submits a cover letter to the NREM Graduate Chair briefly explaining the proposed MS Plan A research and identifying a MS Plan A adviser, who can be the same or different than the MEM adviser
- The student’s current MEM adviser submits a letter recommending the change to the NREM Graduate Chair
- If the student’s proposed MS Plan A adviser is different than the MEM adviser, the proposed Plan A adviser also submits a letter recommending the change to the NREM Graduate Chair
- The student is accepted into the NREM-MS by the Graduate Division

ADMISSION TO NREM MEM FROM NREM MS

A currently enrolled NREM MS student can be admitted into NREM’s MEM program prior to completing their MS degree if ALL the following criteria are met:

- The student submits a cover letter to the NREM Graduate Chair briefly explaining the proposed MEM capstone project
- The student’s current MS adviser submits a letter recommending the change to the NREM Graduate Chair
- The student is accepted into the NREM-MEM by the Graduate Division

STATUS AND DEFICIENCIES

Regular, probationary, and conditional status is determined based on student's academic performance at the time of application. If you are admitted as regular status, you may start your formal graduate program immediately. ***You should read your letter of admission carefully and discuss any deficiencies with your advisor prior to registration in your first term.*** It is expected that students will resolve any deficiencies, etc. by the end of their first year and complete **Form I. Form II will not be signed until all deficiencies are cleared.**

NREM requires prior completed coursework (with a grade of C or higher) that is equivalent to or higher than NREM 310, NREM 220, NREM 203, CHEM 161, and BIOL 171 (See UHM Course Descriptions at <http://www.catalog.hawaii.edu/courses/description-index.htm>). Students who do not have coursework in one or more of these areas may be accepted into the program with course deficiencies (with a grade C or higher), but will be required to make up these deficiencies within their first 1-2 semesters on campus and complete **Form I.**

The minimum required TOEFL score (for international applicants only) is: (A) MS or MEM student: 550, 213, or 80 for paper-based, computer-based, or internet-based examinations, respectively; and (B) PhD student: 600, 250, or 100 for paper-based, computer-based, or internet-based examinations, respectively. The minimum required IELTS score is: (a) MS or MEM student: 6.0 and (b) PhD student: 7.0. The TOEFL/IELTS requirement applies to all international students, except those who are native speakers of English or have received within the last five years a bachelor's or advanced degree from an accredited/recognized college or university in the Australia, Canada, Ireland, New Zealand, Singapore, the United Kingdom, or the United States. Students with low TOEFL/IELTS scores, if admitted, will be required to take the ELI placement test and enroll in ELI courses (English Language Institute <http://www.hawaii.edu/eli/index.html>).

Credits earned for post-baccalaureate courses at an accredited institution of higher education or earned as a post-baccalaureate unclassified (PBU) student at UHM may be applied toward Master degree requirements. If you wish to transfer credits, please follow the credit petition procedure on Graduate Division's [website](#).

ADVISING AND COMMITTEES

ADVISING

Admitted students will check in with their assigned advisor as soon as possible via email and in person upon arriving on campus. The NREM Graduate Committee assigns every incoming student an advisor based on the student's stated interests and consent of the advisor. If you do not know who your advisor is, check with the NREM office staff or the Graduate Chair immediately. Within 1-2 regular semesters of starting the NREM graduate program, all students should have established an effective working relationship with their advisor. If you wish to switch advisors for any reason, please contact the Graduate Chair. Note that only "regular" Graduate NREM faculty (i.e., not cooperating or affiliate) can serve as MS-A, MEM, MS-C, and Ph.D. advisors.

THESIS/DISSERTATION COMMITTEE

The advisor will guide the student's program and assist with the development of a thesis/dissertation research topic and proposal, schedule and administer the Comprehensive (for PhD students only) and Defense (MS and PhD) examinations, and oversee the completion of the degree requirements.

With guidance from the advisor, the student is responsible for forming their committee. The committee's role is to review and approve the research at the proposal and final stage. The committee is also responsible for examining the comprehensive knowledge of a PhD student, to determine their fitness to proceed to candidacy. The student must keep the committee informed throughout their academic journey. Specific information can be found on the Graduate Division's website:

<http://www.manoa.hawaii.edu/graduate/content/committee-composition-potential-members>. The required composition of committees is discussed under each relevant degree section below. Emeriti faculty may serve as committee members, but not chairs. Non-graduate faculty may serve, but must be petitioned. The student must submit a petition (a memo and a CV of the proposed committee member) to the NREM Graduate Committee for approval to add a non-UH Mānoa graduate faculty member to their graduate committee prior to submitting the same petition and requesting approval from the UHM Graduate Division. PhD and MS committees can be co-chaired by NREM Cooperating faculty, alongside an NREM regular graduate faculty member as chair.

DEGREE OFFERINGS AND SPECIFIC REQUIREMENTS

NREM offers the following graduate degrees, certificates, and specialization: Master of Environmental Management (MEM), Master of Science (MS Plans A and C), and PhD in Natural Resources and Environmental Management; and a graduate specialization in Ecology, Evolution and Conservation Biology (<http://www.hawaii.edu/eecb/>). Each of these is detailed in sections below.

MEM DEGREE

NREM offers a Master of Environmental Management (MEM) degree, a course driven, professional program that includes an integrated capstone experience.

REQUIREMENTS OF MEM DEGREE

This is a course-driven professional degree that requires a total of 36 credits. Students are required to declare a concentration from one of four possible concentration areas (see below). Courses include the Primary Master's Core (9 credits), research methods (3 credits), a minimum of 9 elective credits from the chosen concentration area, a minimum of 3 elective credits from each of the other three concentration areas, and a 6-credit capstone experience.

Primary Master's Core (9 credits)

- NREM 600 Foundations of NREM and Policy (4)
- NREM 601 Social-Ecological Systems Analysis of NREM (4)
- NREM 701 Research Seminar in NREM (1)

Research Methods (3 credits)

- Course in research methods (3); 400-level or above

MEM Concentration Areas (total 18 credits)

MEM students will select a concentration area from one of four options: (a) Geospatial Analysis & Modeling, (b) Environmental Policy & Economics, (c) Applied Terrestrial Ecology, and (d) Land & Water Resource Management. They are required to take a minimum of 9 credits from their concentration area and 3 credits from each of the other areas. Of the 18 elective credits required: **(i) at least 12 credits must be NREM courses; and (ii) a maximum of 12 credits of upper-division undergraduate course credits (400-level) are allowed – however, this reduces to 9 credits if a 400-level course(s) is taken to fulfill the research methods requirement.**

Course substitutions for courses outside the core will be considered via a petition by a faculty advisor to the curriculum committee. No 699 courses may be used to fulfill the concentration area credits. Current MEM Concentration Areas can be found on the NREM Graduate website: <https://cms.ctahr.hawaii.edu/nrem/GRADUATE/>

MEM Capstone Experience (6 credits)

A capstone experience is required for all MEM students. The capstone experience consists of: (i) NREM 695 (1 credit), to be taken when the student is preparing their proposal; and (ii) NREM 696 (3 credits) and NREM 699 (2 credits; register with faculty advisor), to be taken when the student is completing their capstone experience and is writing up their final document. The capstone proposal requires approval from the faculty advisor. The capstone experience requires approval of the MEM Capstone Panel consisting of the advisor, the NREM 696 course instructor, and an at-large Panel member if not NREM 695 course instructor.

The Capstone Experience requirement may be fulfilled in several ways, based on each individual student's interests. Typical capstone experiences will involve: (i) an internship/coop/special field experience; (ii) an investigation of a special topic; and/or (iii) development of a project, directed readings/study, or a research project. Each student is expected to take the primary role in identifying and organizing their capstone experience. In meeting this requirement, it will be important for students to demonstrate that they are getting an "integrative" experience in natural resources and environmental management. Each student will be required to give a public proposal and defense presentation, and provide a written proposal and final document on their capstone experience, both of which will be evaluated by the MEM Capstone Panel.

NREM MEM – A STEP-BY-STEP PLANNING GUIDE

1. Contact your academic advisor before the first semester begins. With your advisor, discuss (i) fulfillment of deficiencies (if any), (ii) transferrable credits (if any), (iii) course plan, and (iv) capstone experience.
2. Any deficiencies? If no, submit [Form I](#). If yes, complete the deficiencies by no later than the end of the first year and then submit [Form I](#).
3. Any transferable credits? Credits earned for post-baccalaureate courses at an accredited institution of higher education or earned as a post-baccalaureate unclassified (PBU) student at UHM may be applied toward MEM degree requirements. Refer to the procedures and deadlines (must be processed in the first semester) [here](#).
4. Make a tentative two-year course plan, including a timeline for the capstone experience.
 - The MEM Program requires 36 total credits. Courses include the Primary Master's Core (9 credits), research methods (3 credits), a minimum of 9 credits from the chosen concentration area, a minimum of 3 credits from each of the other concentration areas, and a 6-credit capstone experience.
 - Plan on completing the primary core requirement in the first year.
 - Plan on taking NREM 695 in the 2nd semester and NREM 696 & NREM 699 in the 4th semester.

Core courses	Semester (to be) taken
NREM 600 (4) [Fall of 1st year]	_____
NREM 601 (4) [Spring of 1st year]	_____
NREM 701 (1)	_____
Elective courses	
Course in graduate research methods (3)	
Course Alpha/No. _____ Cr. ____	_____
Courses in your concentration area (9)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Courses in other concentration area (9)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Capstone experience	
NREM 695 (1) [Spring of 1st year]	_____
NREM 696 (3) [Spring of 2nd year]	_____
NREM 699 (2) [Spring of 2nd year]	_____

5. Identify your capstone experience (suggested timeline: by the end of first semester); write proposal in NREM 695 in Spring of 1st year.
6. Publicly defend your capstone proposal and submit MEM-[Form II](#) after successful defense.
 - The NREM 695 course instructor will organize the proposal defense. However, you are responsible for getting all signatures from the committee. Bring your form to the defense.
 - Note: If you have any deficiencies, the Graduate Chair will not sign Form II.
7. Register for NREM 696 and NREM 699 (with your advisor) when you are completing the capstone experience and are writing up a final capstone paper (should be Spring of your 2nd year).

8. File a [Graduate Application for Degree \(form\)](#) with Graduate Division the semester you plan to graduate (should be Spring of 2nd year). Note that the deadline to file is quite early in the term, so check the academic calendar!
9. Publicly defend your final capstone paper and submit MEM-[Form III](#) after successful defense.
 - The NREM 696 course instructor will organize the final defense. However, you are responsible for getting all signatures from the committee. Bring your form to the defense.
10. Submit .pdf of the capstone report to NREM's front office.
11. Celebrate!

MS DEGREE

NREM offers two options for the MS (Master of Science) degree:

Plan A – is a thesis-driven, research degree and a student will only be accepted into this plan if a faculty sponsor has agreed to advise the student.

Plan C – is only for students with exceptional prior work experience which requires a minimum of two semesters of full-time resident study at UHM and a final written and oral comprehensive examination. A student will only be accepted into this plan if a faculty sponsor has agreed to advise the student, and the student has an acceptable plan of study.

REQUIREMENTS OF MS PLAN A DEGREE

In addition to the Primary Master's Core, a set of electives and thesis credits are required for a total of 30 credits. Electives provide background in research methods and depth in the student's area of specialization. A limited number of 699 credits may be applied for the electives (no more than 6 credits).

The remaining credit requirements will be met with thesis credits (NREM 700) for conducting the research project. Once the thesis topic is finalized, a written research proposal must be approved by the committee. A public, oral defense of the proposal in front of the thesis committee is required for final approval of the thesis topic. The final thesis must also be publicly defended and receive committee approval. An announcement of the public defenses, with thesis title, abstract, committee chair and members composition, and defense location, date, and time must be sent to the Graduate Program Chair, office assistant, and (final defense only) Graduate Division at least two weeks in advance.

NREM-specific guidance can be found on NREM's website:

<https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-Masters-Degrees/MS-PLAN-A> for MS-A, and <https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-Masters-Degrees/MS-PLAN-C> for MS-C.

Graduate Division's requirements of the MS-A degree can be reviewed here:

<http://www.manoa.hawaii.edu/graduate/content/masters-plan> and MS-C here:

<http://www.manoa.hawaii.edu/graduate/content/masters-plan-c>

Primary Master Plan A Core (9 Cr)

- NREM 600 Foundations of NREM and Policy (4)
- NREM 601 Social-Ecological Systems Analysis of NREM (4)
- NREM 701 Research Seminar in NREM (1)

Electives (15 Cr)

- Course in research methods (3); 400-level accepted if non NREM course, if NREM course it must be 600-level
- NREM graduate courses (6); 600-level or above
- Other graduate courses for specialization from within or outside of NREM (6); all 6 credits can be satisfied by 400-level course credits – however, this reduces to 3 credits if a 400-level course(s) is taken to fulfill the research methods requirement.

Thesis Option (6 Cr)

- NREM 700 Thesis (6)

* For additional course applicability criteria, refer to:

<http://manoa.hawaii.edu/graduate/content/course-applicability>.

MS PLAN A THESIS COMMITTEE

MS Plan A students should form their preliminary thesis committee and submit [Form IIa](#) for approval (suggested timeline: by the end of their first semester). Students should consult with their advisor about their research interest and potential thesis committee members. The committee membership must have the following components:

- At least three members,
- A minimum of two members must be NREM graduate faculty (i.e., regular, cooperating or affiliate), including the chair, who must be NREM regular faculty,
- All members must be professionals in the field. Approval of a committee member outside the University of Hawai'i must be approved first by the NREM Graduate Chair and then by the UHM Graduate Division,
- Note that a fourth and/or fifth member may be added to the committee when deemed appropriate/necessary to provide required expertise, but the majority of committee members must still be from the NREM graduate faculty, cooperating graduate faculty or affiliate graduate faculty.

NREM MS PLAN A – A STEP-BY-STEP PLANNING GUIDE

1. Contact your academic advisor before the first semester begins. With your advisor, discuss (i) fulfillment of deficiencies (if any), (ii) transferrable credits (if any), and (iii) course plan.
2. Any deficiencies? If no, submit [Form I](#). If yes, complete the deficiencies by no later than the end of the first year and then submit [Form I](#).
3. Any transferable credits? Credits earned for post-baccalaureate courses at an accredited institution of higher education or earned as a post-baccalaureate unclassified (PBU)

student at UHM may be applied toward MS degree requirements. Refer to the procedures and deadlines (must be processed in your first semester) [here](#).

4. Make a tentative course plan. The NREM MS Plan A program requires 30 total credits, including 9 Primary Master’s Core course credits, 15 elective course credits, and 6 thesis credits.

Core courses	Semester (to be) taken
NREM 600 (4)	_____
NREM 601 (4)	_____
NREM 701 (1)	_____
Elective courses	
Course in graduate research methods (3)	
Course Alpha/No. _____ Cr. ____	_____
NREM graduate courses (6)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Other graduate courses for specialization (6)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Thesis credits	
NREM 700 ¹⁾ (6)	_____

¹⁾ Master’s Plan A students may register for NREM 700F after completing all Plan A requirements including the required NREM 700 credits. Students enrolled in one credit of 700F are considered to be carrying a full-time load. Use an [Enrollment in GRAD 700F](#) form to enroll in NREM 700F.

5. Form your thesis committee and submit MS-[Form IIa](#) (suggested timeline: by the end of first semester).
 - Review the “[Committee Composition](#)” policy and guidelines available at the Graduate Division website when considering potential committee members.
6. Defend your thesis proposal and submit MS-[Form II](#) after successful defense.
 - **The thesis proposal defense must be open to the public.** An announcement with thesis title, abstract, committee chair and members, and defense date, time, and

location must be sent to the NREM Graduate Chair and NREM Office Assistant **no later than two weeks prior to the proposal defense.**

- Review the “[Thesis & Dissertation](#)” policy and guidelines available at the Graduate Division website. It is important to familiarize yourself with the policies associated with MS thesis.
 - Remember to bring MS-[Form II](#) to the defense.
 - Note you will need your approved proposal to obtain Institutional Review Board ([IRB](#)) clearances if you use human subjects in research activities.
 - Note: If you have any deficiencies, the Graduate Chair will not sign Form II.
7. Do your research.
 - Ensure you have obtained all needed IRB clearances!
 8. In the semester you plan to graduate, file a [Graduate Application for Degree](#) with the Graduate Division by the deadline (watch out – it is quite early in the term!).
 9. Defend your final thesis.
 - Review the “[Final Defense](#)” policy and guidelines available at the Graduate Division website before scheduling a defense.
 - **The final thesis defense must be open to the public.** An announcement with thesis title, abstract, committee chair and members, and defense date, time, and location must be sent to the NREM Graduate Chair, and NREM Office Assistant **no later than two weeks prior to the defense.**
 - Remember to bring MS-[Form III](#) to the defense.
 - Submit MS-[Form III](#) after successful defense.
 10. Submit MS-[Form IV](#) once your committee has approved your written thesis.
 11. Submit your approved thesis to [Proquest](#).
 - The [Style and Policy Manual for Thesis and Dissertation](#) is available at the Graduate Division website.
 - Note: you must be registered for at least one credit of NREM 700 in the semester you graduate. NREM Students enrolled in one credit of 700F are considered to be carrying a full-time load. Use an [Enrollment in GRAD 700F](#) form to enroll in NREM 700F.
 - Close your IRB protocol, if you have one.
 12. Celebrate!

REQUIREMENTS OF AN MS-PLAN C DEGREE

THE MS-C IS CURRENTLY BEING REDESIGNED. Description below is not accurate.

Purpose. The NREM [Plan C](#) recognizes vital knowledge gained through work experience and offers the opportunity for a student to leverage this experience to earn a master’s degree within a year. This degree is for mid-career professionals who wish to build on their work experience to

develop additional skills and/or knowledge that will help them advance their careers. Plan C students enroll in the NREM master's core, which focuses on analysis of social-ecological systems, take two or more elective classes to gain additional skills, and complete a capstone project. In doing so, graduates will develop interdisciplinary environmental knowledge, new perspectives on issues in natural resource and environmental management, and critical skillsets and credentials to support their careers, while enriching NREM and the learning of other students with their experience.

Program of Study. The NREM Plan C student must complete a minimum of 18 graduate credit hours, consisting of 12 credits of the primary NREM Master's core and 6 elective credits (see specific course requirements below). In the first semester of study, the Plan C student must undergo a [general exam](#) of their capstone project proposal, which will be administered by a committee composed of the Advisor and NREM Graduate Committee. After the student passes the exam, a program committee including NREM faculty will be nominated by the student's advisor and approved by the Graduate Committee. Chaired by the student's advisor, the program committee will guide the student through the rest of the recommended program of study. After the student passes the general exam, the Graduate Program chair shall submit to the Graduate Division a copy of the recommended program of study for the student based on the exam results. The student must pass a [final exam](#), which shall consist of a written report, oral presentation, and oral examination of the student by the program committee, following receipt of the written report and oral presentation. The exam will test the student's level of comprehension and achievement related to their coursework and capstone project at the master's level. The student must be [registered](#) in appropriate coursework during the term in which the degree is awarded.

Primary Master's Plan C Core (9 credits)

- NREM 600 Foundations of Natural Resources and Environmental Management and Policy (4)
- NREM 601 Social-Ecological Systems Analysis of NREM (4)
- NREM 701 Research Seminar in NREM (1)

Electives (6 credits)

- NREM graduate courses (6); 600-level or above, none of which may be NREM 699

Capstone

- NREM 696 Capstone Experience in NREM (3)

1. Contact your academic advisor before the first semester begins. With your advisor, discuss (i) fulfillment of deficiencies (if any – you must resolve these before applying) and (ii) program plan (which you also must have prior to application).
2. Any transferable credits? Credits earned for post-baccalaureate courses at an accredited institution of higher education or earned as a post-baccalaureate unclassified (PBU) student at UHM may be applied toward MS degree requirements. Refer to the procedures and deadlines (must be processed in your first semester) [here](#).
3. Submit [Form I](#) as soon as possible.
4. Pass a general entrance exam within six weeks of enrollment. This involves an oral defense of the student’s past experience and program plan. An announcement with title, abstract, date, time, and location must be sent to the NREM Graduate Chair, and NREM Office Assistant **no later than two weeks prior to the exam**. File **MS-C Form II**.
 - The entrance exam committee consists of the student’s advisor and the NREM Graduate Committee.
 - Remember to bring [Form II](#) to the defense.
 - Note you will need your approved proposal to obtain Institutional Review Board clearances:
<https://www.hawaii.edu/researchcompliance/institutional-review-board-irb-0>
5. Take courses. The NREM MS Plan C program requires 18 total credits, including 9 Primary Master’s Core course credits, 6 elective graduate (600 and above; 400 level not allowed) course credits, and 3 capstone credits.

Core courses	Semester (to be) taken
NREM 600 (4) [Fall]	_____
NREM 601 (4) [Spring]	_____
NREM 701 (1)	_____
Elective courses	
Graduate courses (6)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Capstone credits	
NREM 696 (3)	_____

6. Conduct capstone.

7. In the semester you plan to graduate, file a [Graduate Application for Degree \(Link to the Form\)](#) with the Graduate Division by the deadline (watch out – it is quite early in the term!).
8. Pass final exam. The exam consists of a written report, public oral presentation of capstone, and oral examination by committee. Submit MS-C [Form III](#).
9. Submit .pdf of the capstone report to NREM's front office.
10. File a [Graduate Application for Degree \(Link to the Form\)](#) with the Graduate Division.
11. Celebrate!

PHD DEGREE

NREM offers a PhD in Natural Resources and Environmental Management. To meet the integrative, multi-disciplinary intent of the NREM PhD program, a set of graduate level courses (NREM PhD Core) is required of every student. In addition, a set of electives meant to provide background in research methods and depth in the student's specialization area are required. The remaining degree requirements will be met by dissertation credits (NREM 800). All PhD students must write and publicly defend a dissertation proposal and pass a comprehensive exam (described below) to advance to candidacy. Then, they must successfully write and defend their dissertation to earn a Ph.D. Upon completion of the research, students must again publicly defend their dissertation. More detail on these procedures are provided below.

PHD COURSE REQUIREMENTS

The NREM Ph.D. course load is 18 credits. In addition to the NREM PhD core and electives described below, students are encouraged to enroll in courses that deepen their knowledge in their chosen field(s) of research, in consultation with their advisor and committee.

NREM-specific guidance can be found on the NREM website:

<https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-PHD>. University rules governing PhD degrees can be found on Graduate Division's website:

<http://www.manoa.hawaii.edu/graduate/content/doctorate>

NREM PhD Core (5 Cr)

- NREM 600 Foundations of Natural Resources and Environmental Management and Policy (4 credits)
- NREM 701 Research Seminar in NREM (1)

Electives (12 Cr, chosen in consultation with advisor and committee)

- Two analytic courses that focuses on research design, research evaluation, data collection, and/or data analysis (6); 600-level or above
- Two graduate courses for specialization (6); 600-level or above

Dissertation (1 Cr)

- NREM 800 Dissertation (1)

COURSE OF STUDY AND MENTORING PLAN

Before the end of the first semester in the student's first year, the student and advisor should develop a course of study and mentoring plan. Since the NREM PhD program is very flexible, the student and advisor should work together to identify courses, activities, and a mentoring team that will best support the student's research and career goals. The plan should include courses

completed and courses to be taken, as well as broader information that helps the graduate committee determine the relevancy of the coursework. The course of study and mentoring plan should meet the basic requirements of the NREM PhD degree but can include additional coursework at the discretion of the student and advisor. It should be formatted as follows (see [template](#)):

- Statement of <500 words explaining the planned doctoral research, including relevant background, research questions, methods, and application
- List of undergraduate courses relevant to this planned research, including credit hours and grades, organized by content (e.g., biology, economics, ecology)
- List of graduate courses relevant to this planned research taken or to be taken, including credit hours and grades, organized by content. Courses taken as part of the NREM PhD program should be clearly noted, and their categorization (methods or depth) should be included.
- List of scholarly activities
- Timeline of comprehensive exam, research activities planned for the next 12-24 months
- Record of conversations about the comprehensive examination committee

This plan should be submitted to and approved by the Graduate Committee before the registration deadline for the second semester and is required before submitting Form I. It should be updated and re-submitted on an annual basis.

ANNUAL PROGRESS FORMS

PhD students should meet with their advisors towards the end of Spring semester each year to assess progress. The [annual progress form](#) should be submitted to the Graduate Program Administrator, who will forward it to Graduate Division.

PHD DISSERTATION COMMITTEE

PhD students should form their dissertation committees by the end of their first year and submit [Form IIa](#) to the Graduate Chair for approval. The PhD committee is responsible for designing and proctoring the comprehensive exam and adjudicating the final dissertation defense. In NREM, in addition to the [requirements of the Graduate Division](#), the committee membership must have the following components:

- At least five members
- All members must hold a PhD or another terminal graduate degree
- A minimum of two members must be regular NREM graduate faculty (i.e., not cooperating or affiliate)

- A minimum of three members must be regular NREM graduate faculty, cooperating graduate faculty, or affiliate graduate faculty members in NREM
- One external committee member (the University Representative) must be University of Hawai'i graduate faculty from a non-NREM department. See Grad Division [website](#) for specific rules regarding the U Rep.
- One chair who is regular NREM graduate faculty member (i.e., not cooperating or affiliate). Co-chairs are permitted, but must be cooperating or affiliate level 3 graduate faculty.

During the first semester of enrollment, the student should consult with their advisor to identify potential members of the committee. The student is responsible for approaching these potential members and asking them whether they are willing to serve on the committee, as well as meeting with members before their exam to garner feedback on their research proposal as well as exam content.

DISSERTATION PROPOSAL

The student's dissertation proposal should be conceived starting in the first semester the student is enrolled in the PhD program, and an advanced draft should be complete at least a month before the start of the comprehensive exam. The proposal should be developed with input and guidance of the advisor and other relevant faculty members and individuals.

Proposal Content

Proposal structure is flexible based on the advice of the adviser and the comprehensive exam committee but is expected to be at least five single spaced pages in length. It should, at minimum, include:

- *Abstract.* Include the motivation for the research, hypotheses or questions, and a brief methods summary.
- *Background.* Describe the previous work that has been done in this field, and critically evaluate existing knowledge. Identify gaps in this knowledge. Relate these gaps to the proposed research.
- *Hypotheses or questions.* State the hypotheses that the research aims to test, or the questions the research aims to answer.
- *Proposed methods.* Describe the approach that will be used to test hypotheses or answer questions. Explicitly link hypotheses/questions to methods.
- *Initial or possible results.* Indicate the kind of results expected or generated, and how they will be used to support or refute the hypotheses/questions.
- *Expected significance.* Describe how the research will advance scientific understanding and inform real-world decisions.

- *Limitations.* Indicate the potential pitfalls to the proposed methods and indicate possible alternate approaches that could be used to circumvent these problems. Describe the limitations to any interpretations based on expected findings.
- *Work Schedule.* Provide a time schedule of different activities needed to accomplish the proposed work, including analysis and writing.
- *References.* A list of references hyperlinked in the text, created using a reference manager.
- *Figures and/or tables.*

PHD COMPREHENSIVE EXAMINATION POLICY

To be admitted to candidacy for the PhD degree in the NREM department, all students must pass a comprehensive exam. The comprehensive exam ascertains the student's comprehension of knowledge fundamental to NREM and to their specialization within NREM and is administered by the comprehensive exam committee. All comprehensive exams have both a written and an oral component, and the precise format is determined by the student's comprehensive exam committee.

Students may not schedule comprehensive exams until all core courses are successfully completed. Students cannot move to candidacy if they have any deficiencies.

EXAMINATION CONTENT

The exam should be focused on testing the student's capabilities as: (i) a scientist in general – that is, how the student identifies and addresses research problems, (ii) a scientist in NREM – that is, with the ability to conduct research with an interdisciplinary approach, and (iii) a scientist in their specialty area – that is, with advanced technical capabilities and theoretical understanding of their focal research area. Thus, the comprehensive examination questions may cover: (i) knowledge, including theory and methods, in the student's specialty area, (ii) knowledge of interdisciplinary environmental science topics, and (iii) proposed dissertation research.

TIMING OF AND PREPARATION FOR THE COMPREHENSIVE EXAM

Students are encouraged to take the comprehensive exam in the second year of enrollment in the PhD program. Before taking the exam, the student should complete all coursework outlined in their course of study and mentoring plan. They should also have completed a complete draft of their dissertation proposal. The student should begin scheduling and preparing for the examination at least three months in advance of the planned examination date. At least a month before the exam, the student should send their final course and mentoring plan as well

as a draft of their dissertation proposal to all committee members. At this time, the student should also consult with each member regarding their proposal, and knowledge areas to prepare for the exam. Based on committee member feedback, the student should revise their dissertation research proposal before the start of the written exam.

WRITTEN EXAM

- The purpose of the written exam is to test the student on knowledge and capabilities related to their proposed dissertation research, NREM, and research in general.
- Questions will be contributed by each committee member to the chair or co-chairs.
- Questions should be related to relevant courses taken by the student, reading materials provided by the committee member to the student, and/or the student's proposed dissertation research, and should be prepared with guidelines for length (e.g., 4-6 single-spaced pages) and format expected from the student.
- The chair or co-chairs will clarify any uncertainties about the questions with each committee member, and then administer final questions to the student.
- Students will be given no more than 24 contiguous hours to complete each committee member's examination question(s).
- Questions will be administered on the same or separate days over a period not to exceed two calendar weeks.
- The written exam can be open or closed book, at each committee member's discretion.
- Committee members will have at least one week to review student answers and will provide the chair or co-chairs a score and comments, using a common NREM rubric.
- The chair or co-chairs will then communicate these scores to the student, with an overall pass or fail decision.
- Committee members may meet with the student after evaluations have been released to provide additional feedback regarding the examination.
- Passing the written exam requires no more than one failing grade from the committee. That is, if two or more members issue a failing grade on their questions, the written exam is considered a fail.
- In the event of a failed written exam, the student will have one more opportunity to take another written exam within six months with the same examining committee.
- If the student passes the written exam, they will then proceed to the oral exam as described below.

ORAL EXAM

- The oral exam is intended to confirm to the committee members that the student is ready to advance to candidacy (i.e., the proposed research is of sufficient academic rigor and feasibility, and the student has sufficient knowledge to conduct the proposed research).
- The student is required to give a public seminar on their PhD research proposal as part of their oral exam. This seminar must be advertised at least two weeks before the date of the seminar. To schedule the seminar, the student should email nrem1@ctahr.hawaii.edu with a title and <300-word abstract explaining their proposed research, as well as the names of their chair and committee members, time, date, and location of their seminar.
- After the student gives a public presentation but before the closed-door portion of the exam, the committee should excuse the student so they can review the student's record, the written exam, research proposal, and presentation.
- The committee should use the written exam, oral presentation, and written proposal as a starting point for questions during the closed-door session.
- At the end of the oral examination, the student is asked to leave the room so that the committee can discuss the outcome.
- A majority of the committee must vote "pass" for the student to pass.
- After a decision is reached, the student is invited back into the room and the outcome is openly discussed with the student.
- If the outcome is fail, the student will be told of the conditions for passing as judged by the committee, and such conditions will be recorded by the chair or co-chairs and communicated to the NREM Graduate Chair in writing.
- If the student passed the exam, prior to adjournment, committee members sign [Form II](#)
- In the event of a failed oral exam, the student will have one more opportunity to take another oral exam within six months with the same examining committee.

ADVANCEMENT TO CANDIDACY

The outcome of the comprehensive examination and proposal defense is the acceptance of the student to the PhD candidacy in NREM.

DISSERTATION MANUSCRIPT

Please see [guidelines from the Graduate Division](#) regarding formatting, citation, style, submission & publication, and copyright of a dissertation. NREM recommends at least three

chapters formatted with the intent to submit to peer-reviewed journals, plus an introduction and conclusion.

FINAL DISSERTATION DEFENSE

Please follow the [final dissertation defense guidelines](#) from the Graduate Division. Importantly, the student must submit the completed manuscript to the committee no later than two weeks prior to the scheduled defense. NREM recommends submitting the manuscript at least four weeks before the defense. In addition, the student needs to distribute a copy of the abstract to the faculty of his or her graduate program. The abstract may be distributed via email to nrem1@ctahr.hawaii.edu.

NREM DOCTOR OF PHILOSOPHY (PHD) – A STEP-BY-STEP PLANNING GUIDE

1. Contact your academic advisor before the first semester begins. With your advisor, discuss (i) deficiencies (if any), (ii) transferrable credits (if any), and (iii) course plan.
2. Any deficiencies? If no, submit [Form I](#). If yes, complete the deficiencies by no later than the end of the first year and then submit [Form I](#).
3. Make a tentative course plan. The PhD Program requires 18 total credits, 5 of which are the Primary PhD Core courses, 12 are elective courses, and the remaining one is a dissertation credit. Up to 3 credits of 699 credits may be approved as a specialization course on a case-by-case basis.

Core courses	Semester (to be) taken
NREM 600 (4)	_____
NREM 701 (1)	_____
Elective courses	
Course in graduate research methods (6)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Other graduate courses for specialization (6)	
Course Alpha/No. _____ Cr. ____	_____
Course Alpha/No. _____ Cr. ____	_____
Dissertation credit	
NREM 800 ¹⁾ (1)	_____

- ¹⁾ Students enrolled only in 1 credit of NREM 800 are considered to be carrying a full-time load.
4. Prepare your course of study and mentoring plan and discuss this with your advisor. Submit the plan to the Graduate Committee by the end of the first semester. The plan should be updated and discussed annually with the advisor prior to submitting it to the Graduate Committee. A template can be found [here](#).
 5. Form your dissertation committee and submit [Form IIa](#) (suggested timeline: by the end of first year).
 - Review the “[Committee Composition](#)” policy and guidelines available at the Graduate Division website when considering potential committee members.
 6. Schedule a comprehensive exam and a dissertation proposal defense when most course work (~80%) and the dissertation proposal have been completed.
 - You should begin scheduling and preparing for the examination at least 3 months in advance.
 7. Take written and then oral comprehensive exams.
 8. Defend your dissertation proposal and submit [Form II](#) after successful defense.
 - **The proposal defense must be open to the public.** An announcement with dissertation title, abstract, names of the chair and committee members, defense date, time, and location must be sent to the NREM Graduate Chair, and NREM Office Assistant **no later than two weeks prior to the defense.**
 - Review the “[Thesis & Dissertation](#)” policy and guidelines available at the Graduate Division website. It is important to familiarize yourself with the policies associated with PhD dissertation at this stage.
 - Note you will need your approved proposal to obtain Institutional Review Board clearances.
 - Note: If you have any deficiencies, the Graduate Chair will not sign Form II.
 9. Do your research.
 - Ensure you have obtained all needed IRB clearances if your research activities involves human subjects!
<https://www.hawaii.edu/researchcompliance/institutional-review-board-irb-0>
 10. Defend your final dissertation.
 - Review the “[Final Defense](#)” policy and guidelines available at the Graduate Division website before scheduling a defense.
 - **The final dissertation defense must be open to the public.** An announcement with dissertation title, abstract, names of the chair and committee, defense date, time, and location must be sent to the Graduate Division, NREM Graduate Chair, and NREM Office Assistant **no later than two weeks prior to the defense.** Use [this form](#) to inform the Graduate Division of the final defense.

- The [Style and Policy Manual for Thesis and Dissertation](#) is available at the Graduate Division website.
 - Consider filing a [Graduate Application for Degree \(Link to the Form\)](#) with Graduate Division. Most students graduate in the semester they hold the defense; be aware that the deadline for filing is quite early in the term, so pay attention to the academic calendar.
 - Close your IRB protocol, if you have one.
11. Submit [Form III](#) after successful defense.
 12. Submit [Form IV](#) to Graduate Division after your committee approves the final written dissertation.
 13. Submit your approved dissertation to [Proquest](#).
 14. Celebrate!

FORMS AND PETITIONS

You have a series of forms that you need to fill out as you progress (e.g., I, IIa, II, III, IV). All forms for your specific program can be found on NREM's program pages:

MEM: <https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-Masters-Degrees/MEM>

MS: <https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-Masters-Degrees/MS-PLAN-A>

PhD: <https://cms.ctahr.hawaii.edu/nrem/Graduate/NREM-PHD>

The University of Hawai'i Graduate Division website contains links to form-fillable forms and petitions (<http://manoa.hawaii.edu/graduate/content/forms>):

- Forms I-IV for MS Plan A students
- Forms I-IV for PhD students
- Graduate Application for Degree
- Petition for Leave of Absence
- Petition to Transfer Credits
- Petition to Substitute or Waive Courses
- Petition for Submission of Undergraduate Excess Credits Toward a Master's Degree
- Petition to Revise Thesis/Dissertation Committee
- Petition for Remote Committee Participation
- Graduate Assistant Petition to Enroll in More than 9 Credits
- Graduate Assistant Petition to Work More than 20 Hours
- Etc.

Note: no petitions/memos should be sent to Graduate Division directly.

The NREM procedure for FORMS is to (in this order):

1. properly and completely fill out all information on the forms (name, dates, checked boxed, etc.),
2. obtain all signatures other than the Graduate Chair's,
3. turn in to the NREM Graduate Program Administrative Assistant for the Graduate Chair's signature.

We will then forward on to Graduate Division, with a copy to you for your records.

The Graduate Division website also contains various **PETITIONS**, for instance to revise committees, extend submission deadlines, request a leave of absence, etc. **The NREM procedure for PETITIONS** is to have your advisor send an email to the Graduate Chair, copied to the Graduate Program Administrative Assistant. **The email should contain:**

1. a clear statement of your “ask”
2. a well edited explanation and justification
3. If petitioning for outside committee members, please include the member’s current CV.

We will then prepare the memo and send to Graduate Division for their approval.

OTHER NREM & MEM GRADUATE PROGRAM POLICIES

1. **Deficiency credits.** A course used to meet a deficiency cannot be used to satisfy any other graduate degree program requirement (e.g., if you have a deficiency in Statistics, you may NOT take a graduate-level Statistics class to simultaneously meet your deficiency and graduate research methods requirements).
2. **400-level courses.** An “NREM graduate course” is defined as a NREM course at the 600-level or above.
 - MS Plan A: A maximum of 6 credits at the 400-level may be taken to meet the degree requirement, excluding the “NREM graduate courses” degree requirement
 - MS Plan C: All elective courses have to be 600-level and above.
 - MEM: A maximum of 12 credits at the 400-level may be taken to meet the degree requirement
 - PhD: All elective courses have to be 600-level and above.
3. **Limits on 699 credits.** The following number of 699 credits can be used to fulfill graduate degree program credit requirements:
 - MEM: 0 credits (699 can be used on a case-by-case basis via a petition), excluding two credits for the Capstone Experience requirement
 - NREM MS Plan A: up to 6 credits
 - NREM MS Plan C: 0 credits (699 can be used on a case-by-case basis via a petition)
 - PhD: up to 3 credits for specialization courses via a petition. Research methods cannot be 699.

SWITCHING BETWEEN DEGREE PROGRAMS IN NREM: CREDITS

1. **Students with NREM degree (BS, MEM, or MS) in the NREM PhD program.** For those students who have an undergraduate, MEM, and/or MS degree(s) in NREM and are pursuing a PhD in NREM, the following rules apply:
 - Any courses (credits) used to fulfill a previous NREM degree requirement cannot be used toward a PhD degree requirement – no double dipping is allowed per UH rules.
 - If NREM 600 (PhD primary core) was taken during the MEM or MS degree, the student must take other appropriate graduate level course(s) as a substitute. The student will consult with their advisor and committee members regarding appropriate substitute course(s).
 - All NREM PhD core classes not taken during the previous NREM degree program(s) and the research methods (which may not be 699) are required.
 - NREM 701 must be taken again to fulfill the core course requirements.
 - Directed reading (NREM 699) may be used in place of required specialization courses on a case by case basis.

2. **Students moving from NREM MEM/MS to PhD without completing MEM/MS.** NREM PhD students who were admitted first to the NREM MS or MEM program and then to the NREM PhD program *prior to completing their MS or MEM degree*:
 - Are required to complete all the NREM PhD program requirements, including
 - o PhD primary core, research methods, and elective course requirements
 - o Dissertation credit requirement
 - o Comprehensive exam
 - o Public proposal and final defenses with their PhD dissertation committee
 - With the discretion of their PhD dissertation committee, students can apply 600-level courses they took during their NREM MS or MEM program toward fulfilling the PhD primary core, research methods, and elective course requirements

SPECIALIZATION IN ECOLOGY, EVOLUTION, AND CONSERVATION BIOLOGY

This specialization is available to MS and PhD students. More information on this program can be found at: <https://www.hawaii.edu/eecb/>

FINANCIAL SUPPORT

WICHE

The NREM program qualifies for the WICHE supported WRGP program. Students who are legal residents in participating states can qualify for Hawai'i resident tuition rates if they apply prior to coming. MEM will be eligible as of 2019-2020 academic year; the MS and PhD are already qualified. See: <http://www.manoa.hawaii.edu/graduate/content/wiche-program>

HAU'OLI MAU LOA FELLOWSHIPS

The Hau'oli Mau Loa Foundation has generously supported MEM graduate students for the past few years. All admitted MEM applicants who went to high school in Hawai'i will receive an invitation to apply. Applications are due in early March. More details can be found at: <https://cms.ctahr.hawaii.edu/nrem/Graduate/HML>.

TEACHING ASSISTANTSHIP

The NREM department offers a number of Teaching Assistantships (**TA**), typically for up to two semesters, to current and incoming graduate students on a competitive basis. TAs receive a stipend and full tuition waiver. An announcement will be made towards the end of every semester for TAs for the following semester. Students interested in applying for a TA are encouraged to check with the NREM Graduate Chair or department office assistant about the deadlines and procedure for application. Other departments often hire NREM graduate students to TA their classes. Keep an eye out for announcements via listservs and the NREM website.

RESEARCH ASSISTANTSHIP

NREM offers research assistantships (**RA**) to its current and incoming students through ongoing funded research projects, which also includes a full tuition waiver. Typically, an RA supports the research activities of a faculty member who is the principal investigator (PI) of a funded project. The project PI is responsible for advertising and interviewing potential candidates, and candidates should talk with the PI about the expectations. Many RA job postings can be found at: <http://workatuh.hawaii.edu/>, listservs, and on hallway bulletin boards. The best thing to do, however, is to make appointments with PIs whose work you admire, and ask if there is any funding.

GRADUATE STUDENT ORGANIZATION GRANT

The Graduate Student Organization (GSO) at the University of Hawai'i at Mānoa, represents the academic interests of graduate students attending the university and endeavors to facilitate research initiatives from graduate students through its grants and awards program. The GSO

provides awards to graduate students for conducting research and attending conferences worldwide. Check with your NREM GSO representative about these programs and inform him/her before applying for funding. Interested students can also refer to the GSO website at <http://gso.hawaii.edu/html/index.php> for more information about application processes and eligibility criteria.

OTHER FINANCIAL AID

Graduate Division Achievement Scholarship

<http://manoa.hawaii.edu/graduate/content/achievement-scholarships>

- (Note that NREM will award achievement scholarships each semester; you should keep an eye out for the email announcement asking for you to apply if you are interested whether you have financial support or not!)

Graduate Division Fellowships/Scholarships

<http://manoa.hawaii.edu/graduate/content/fellowships-scholarships>

East-West Center Fellowships/Scholarships

<http://www.eastwestcenter.org/scholarships-fellowships>

Western Interstate Commission on Higher Education (WICHE)

<http://manoa.hawaii.edu/graduate/content/wiche-program>

American Association of University Women

<https://www.aauw.org/what-we-do/educational-funding-and-awards/>

STUDENT RESOURCES

The University has a Systemwide Student Conduct Code, which sets out appropriate ways of interacting and procedures for dealing with academic dishonesty. Please review these.

<https://www.hawaii.edu/policy/?action=viewPolicy&policySection=ep&policyChapter=7&policyNumber=208>

Students should be aware of the academic grievance procedures. The policy and guidelines seek to ensure consistent and equitable treatment in resolving disputes in academic relationships, including those between faculty and students.

http://studentaffairs.manoa.hawaii.edu/downloads/academic_grievance/Academic_Grievance_Procedures.pdf

The University is committed to being a safe and respectful campus, free from sex discrimination and gender-based violence. Know your rights and what to do if you encounter an issue.

<https://www.hawaii.edu/titleix/>

NREM GRADUATE COURSES

NREM 600 Foundations of Natural Resource and Environmental Management and Policy

(4) Critical evaluation of environmental and social components of NREM and policy. Students develop research skills and integrative knowledge important for all resource managers in, e.g., ecology, applied economics, hydrology, policy/management, soils, and human dimensions. Pre: graduate standing or consent. (Fall only)

NREM 601 Social-Ecological Systems Analysis of Natural Resource and Environmental Management

(4) Case study approach to building the structural and behavioral framework for complex, dynamic systems underlying sustainable NREM and policy, emphasizing the transdisciplinary interactions of the ecological and economic components. Pre: 600, and ECON 130 or NREM/SUST 220, and BIOL 171, or consent. (Spring only)

NREM 610 Advanced Methods in Wildlife Management & Conservation **(4)** Introduces advanced techniques for wildlife management and conservation. In addition to hands-on training, students will learn underlying biological and ecological principles, as well as quantitative skills, with an emphasis on sustainable management. (Spring only)

NREM 611 Resource and Environmental Policy Analysis **(3)** Exploration of institutional and policy dimensions of natural resource development, management, allocation, markets and pricing, focusing on their environmental impacts. Emphasis on policy analysis using case studies and empirical findings. Original paper required. A-F only. Pre: grade of C- or above in ECON 130 or NREM/SUST 220, or consent. (Alt. years: Fall) (Cross-listed as SUST 611)

NREM 612 Predicting and Controlling Degradation in Human-Dominated Terrestrial Ecosystems **(3)** Historic, present, and projected trends in understanding and managing human-dominated ecosystems; predicting, measuring and mitigating degradation especially in terrestrial ecosystems with a focus on small volcanic islands in tropical settings. A-F only. Pre: 301/SUST 311 and 304 (or equivalent) and 600. Recommended 461, or consent. (Fall only) (Cross-listed as SUST 612)

NREM 620 Kaialulu: Care and Collaborative Management of Natural Resources **(3)** Engagement with theory and practice of collaboration to care for natural resources. Topics include community based management, common property, Hawaiian knowledge, co-management, and access through readings, discussion, and projects with Hawai'i communities. (Spring only)

NREM 627 Applied Microeconomic Analysis **(3)** Economic applications to the agricultural and nonagricultural industries are emphasized. Econometric techniques are used to estimate demand, supply, production and cost functions which are analyzed in terms of economic theory and market information. A-F only. Pre: AREC 626 and ECON 627, or consent.

NREM 631 Sustainable Agriculture Seminar **(3)** Critical evaluation of existing and alternative cropping systems from a long-term perspective. Value conflicts and resolution. Repeatable unlimited times. Pre: graduate standing or advanced undergraduate standing, and consent.

NREM 637 Resource Economics (3) Analysis of problems of development and management of natural resources with emphasis on resources in agriculture and role in economic development. Pre: ECON 608 and ECON 629. (Cross-listed as ECON 637 and SUST 637)

NREM 640 Land Systems Science (3) Through discussion of primary land systems science literature and use of environmental modeling software, this interdisciplinary course explores how drivers, states, and trends in human appropriation of land affect socio-ecological system function. Pre: 477 or 677 or GEOG 470 or GEOG 476 or GG 460 or GG 461. (Alt. years: Fall) (Cross-listed as SUST 640)

NREM 652 Information Research Skills (1) Examines the use of libraries and information technology for scholarly investigation in support of scientific research; provides experience utilizing and critically evaluating a variety of print and electronic sources in basic and applied sciences. Pre: consent. (Cross-listed as ANSC 652, FSHN 652, and TPSS 652)

NREM 658 Advanced Environmental Benefit Cost Analysis (3) Advanced environmental benefit-cost analysis will require that proficiency be demonstrated on fundamentals and address topics related to sustainability, including income equality, non-market goods, risk, cost of public funds, and the social discount rate. (Cross-listed as SUST 658)

NREM 660 Hydrologic Processes in Soils (3) (2 Lec, 1 3-hr Lab) Hydrologic properties in soils and the processes involved in water infiltration drainage and solute transport. Emphasis on key parameters required for modeling. Recommended: CEE 424 or consent. (Fall only) (Cross-listed as BE 664 and CEE 625)

NREM 662 Watershed Hydrology (3) Application of basic hydrologic processes and management practices occurring on small islands watersheds. Assumes an understanding of calculus and fundamental concepts of physics on topics of "Physical Hydrology: Fluid Dynamics" and "Open Channel Hydraulics". The discipline in hydrology now also requires working knowledge of geographic information system on topics of "Watershed delineation" and "Rainfall-runoff process." Pre: NREM 203, PHYS 170, NREM 477 or GEOG 388. (Once a year)

NREM 664 Small Watershed Modeling (3) Introduction to process-based modeling of watershed with emphasis on model applications. Deals with the characterization and simulation of small watershed hydrologic and pollutant transport processes. Pre: CEE 424 (or concurrent) or GG/SUST 425 (or concurrent) or BS degree from NREM, or consent. (Spring only)

NREM 665 Coastal and Wetland Ecology and Management (3) Study of marshes, mangroves, sea grass beds, and coral reefs. Emphasis on the hydrology, biogeochemistry, productivity, and community dynamics of these systems. Response to perturbations and management strategies will also be discussed. Pre: advanced undergraduate coursework in hydrology, soils, and ecosystem ecology recommended.

NREM 670 Interdisciplinary Methods for Agrarian Systems (3) Interdisciplinary methodologies for conducting research and impact analyses on agrarian systems, sustainable development, and resource management. Repeatable one time. Pre: consent. (Cross-listed as TPSS 670)

NREM 671 International Agricultural Systems (2) Analysis of trends and strategies in international agricultural research and development. International agricultural research centers

(IARC), Food and Agriculture Organization (FAO), university networks and consortia, and private voluntary organizations (PVOs). Pre: graduate standing or advanced undergraduate standing, and consent.

NREM 677 Remote Sensing of the Environment (3) Fundamentals, techniques, and applications of remote sensing for natural resource assessments and environmental monitoring. Lab consisting of field radiometric exercises, computer modeling of energy-matter interaction, processing, and analysis of remotely sensed imagery. Pre: one physics course (e.g. PHYS 151), one calculus course (e.g. 203), and one statistics course (e.g. 310), or consent. Recommended: either GEOG 470 or GG 460 or one introductory remote sensing course. (Alt. years)

NREM 680 Ecosystem Ecology (4) (2 Lec, 1 3-hr Lab) Principles of ecosystem ecology with emphasis on tropical forests, human impacts, and global environmental change. Factors controlling ecosystem structure, productivity, nutrient cycling, plant-soil-atmosphere interactions, and energy balance. Field and laboratory methods in ecosystem science. Pre: advanced undergraduate coursework in ecology and soil science; graduate standing; and consent. (Alt. years: spring)

NREM 682 Restoration Ecology (3) Graduate seminar on foundations of restoration ecology, application of ecological theory to restoration practice. Emphasis on restoration of structure and function in degraded terrestrial ecosystems using case studies from Hawai'i and around the world. Pre: advanced undergraduate ecology course and graduate standing, or consent. Completion of 680 recommended, but not required. (Alt. years)

NREM 685 Landscape Ecology (3) Focuses on the history, theories, and contemporary views of landscapes; including scale, land cover, land use, landscape metrics, disturbance regimes, land management, landscape change, the relationship of landscapes to species, and modeling. Pre: graduate students, or consent.

NREM 690 Conservation Biology (3) Theories and concepts of ecology, evolution and genetics for conservation of biological diversity. Topics will include restoration ecology, management planning, laws and policies, biological invasions. Pre: BIOL 375 and either ZOO 480 or BOT 462; and either ZOO 410, 439, 620, 623, BOT 453, 454, 456, or 492. (Cross-listed as BOT 690 and ZOO 690)

NREM 691 Advanced Topics in Natural Resources and Environmental Management (V) Study and discussion of significant topics and problems at an advanced level. Offered by visiting or existing faculty as a special course. Repeatable one time. Pre: graduate standing or consent.

NREM 695 Capstone Prep in NREM (1) Preparation for NREM capstone experience. NREM or MEM majors only. Pre: NREM 600, 601 (or concurrent), and one graduate methods course (or concurrent).

NREM 696 Capstone Experience in NREM (3) Capstone experience in NREM. NREM or MEM majors only. A-F only. Pre: NREM 695 and 601 (or consent).

NREM 699 Directed Research (V) Repeatable unlimited times. Pre: graduate standing.

NREM 700 Thesis Research (V) Repeatable unlimited times.

NREM 701 Research Seminar (1) Presentation and discussion of student research proposals, theses and dissertations, and research presentations by NREM faculty, students, and invited speakers. A-F only. Pre: consent.

NREM 800 Dissertation Research (V) Repeatable unlimited times.

OTHER DEPARTMENTS AT UHM WITH POTENTIALLY RELEVANT COURSES

- Anthropology
- Botany
- Civil and Environmental Engineering
- Economics
- Educational Psychology
- Geology and Geophysics
- Geography and Environment
- Hawaiian Studies
- Marine Biology
- Pacific Island Studies
- Planning
- Political Science
- Sociology
- Tropical Plant and Soil Sciences
- Zoology

SUGGESTED GRADUATE LEVEL RESEARCH METHODS COURSES

Ultimately, the choice of a course to meet the graduate level research methods requirement is between the student, their advisor, and thesis/dissertation committee. Therefore, this list is not comprehensive. Moreover, students are discovering new classes each year – please let us know if you have suggested additions (or deletions).

STATISTICS

BE 622 Experimental Methods in Cause-Effect Modeling (3) Factorial designs and fractional factorial designs for screening variable and response optimization, Response surface methodology. Experimental designs appropriate to building and testing multi-variable behavior relationships. Sequential experimental designs.

ECON 628 Quantitative Methods (3) Probability; density and distribution functions; expectation, variance, and co-variance; central limit theorem; maximum likelihood methods; statistical estimation, testing and inference; bivariate regression. Pre: one of 321, AREC 310 or MATH 241 or consent. (cross-listed as AREC 626)

ECON 629 Econometrics (3) Specification, statistical estimation, inference and forecasting of econometric models. Includes advanced topics for single-equation models, pooled models, qualitative dependent variables, simultaneous systems, distributed lags, and time series. Pre: 628 or consent. (cross-listed as AREC 634)

ECON 686 Strategic Behavior and Experimental Economics (3) Experimental economics: methodology. Experimental game theory. Market experiments. Applications include: topics in industrial organization, provision of public goods, asset markets, auctions. Repeatable one time. Pre: 606 and 608 or consent.

EDEP 601 Introduction to Quantitative Methods (3) Introductory statistics in education and social sciences. Topics include probability distributions; sampling distributions; hypothesis testing using t-tests, correlation, simple regression, ANOVA; and applications in research. (Meets PhD common inquiry methods requirement or elective.)

EDEP 604 Multiple Regression in Behavioral Research (3) Introduction to linear statistical models as principle of data analysis. Topics include multiple regression models with continuous and categorical predictors. ANOVA with multiple factors, ANOVA with repeated measures, and ANCOVA. Pre: 601 or consent. (Cross-listed as PSY 612 and SW 654)

EDEP 605 Factor Analysis (3) Theory and method of factor analysis and related methods of multivariate analysis. (Cross-listed as PSY 613 and SW 655)

EDEP 606 Multivariate Methods (3) Multivariate forms of multiple linear regression, analysis of variance and co-variance. Multiple discriminant analysis, canonical correlation, and principal-components analysis are discussed. (Cross-listed as PSY 614 and SW 656)

ES 480 Qualitative Research Methods (3) Introduction to qualitative data collection methods; explore methods of analyzing data including grounded theory method, discourse analysis and narrative analysis and those used in ethnic, gender and community studies. A-F only. Pre: one upper division ES or SOCS course or consent.

MET 631 Statistical Meteorology (3) Probability; frequency distributions of atmospheric variables; linear models; time series analysis (frequency and time domain); principal component analysis; statistical weather forecasting and verification. Pre: MATH 371 (alt. years)

PPST 691 Methods of Demographic Analysis (3) Statistical evaluation and analysis of population data; data sources; population growth; composition; standardization of rates; mortality and the

life table; nuptiality and fertility distribution, migration, urbanization; projections and stable population theory. Pre: basic statistics or consent. (cross-listed as PH 659)

SOC 605 Seminar in Advanced Statistics (3) Multivariate analysis. Analysis of variance; multiple regression procedures; multiple classification analysis, stepwise regression, discriminant functional analysis and path analysis. Pre: 476

SOC 605L Advanced Statistics Laboratory (1) Required lab for computer applications for analysis of sociological data. CR/NC only. Pre: 476 or consent. Co-requisite: 605

TPSS 603 Experimental Design (4) Design of experiments and variance analyses in biological and agricultural research. Pre: graduate standing or consent. Recommended: ZOOL 632. (Cross-listed as ANSC 603)

ZOOL 631 Biometry (4) (3 Lec, 1/2 hr discussion) Basic statistical methods: design of studies; data exploration; probability; distributions; parametric and non parametric one-sample, two sample, multi sample, regression and correlation analysis; frequency tables. Pre: MATH 241 or consent

ZOOL 632 Advanced Biometry (4) (3 Lec, 1 2-hr Discussion) Multivariate statistical methods: multiple regression and correlation; multiway anova; general linear models; repeated measures and multivariate anova; loglinear analysis and logistic regression. Pre: 631 and MATH 241, or consent.

SOCIAL SCIENCE METHODS

PLAN 605 Planning Models (3) Allocation, decision, derivation, and forecasting models used in the analysis of demographic, economic, land use, and transportation phenomena in urban and regional planning. Repeatable one time. Pre: one of ECON 321, GEOG 380, or SOC 476; or consent.

SOC 606 Research Methods and Design (3) Emphasis on theory selection, theory construction and choice of research strategies

SOC 608 Survey Research Design and Analysis (3) Survey study designs, survey sampling, questionnaire construction, interviewing, pre-tests, pilot studies, logic of measurement and association, table construction and elaboration models. Pre: consent. (cross-listed as EDEA 608)

SOC 609 Seminar Qualitative Research (3) Advanced seminar on conducting fieldwork in natural social settings with emphasis on qualitative techniques, political and ethical considerations, data management and assessment, interpretation and reflexive writing. Repeatable once only. Pre: 478 or consent

FIELD-PRACTICAL

BE 606 Instrumentation and Measurement (3) Measurement concepts and operating principles applied to the selection and use of instruments important to scientists and engineers dealing with biological systems, including automatic data acquisition and processing. Pre: CHEM 151, MATH 241 and ME 311 or consent

COM 612 Communication Research Methods (3) Introduction to the major steps in the research process. Emphasis on the methodological approaches to making choices among alternatives at each step of a research cycle

GEOG 680 Geospatial Analysis of Natural Resource Data (3) The application of geostatistics to estimate spatial dependence to improve soil and regional sampling; provide insight into underlying soil, geographic and geologic process, and to provide quantitative scaling up of point measurements to fields, regions and watersheds. State-space modeling also will be included. A to F only. Pre: 488, ZOO 631, or Times Series Analysis course or consent (cross-listed as TPSS 680)

MODELING

CEE 626 Surface Water Hydrology (3) Deterministic and probabilistic methods include reliability of empirical distributions, multiple regression analysis, extreme value analysis and domain of attraction. Short-memory models for stochastic simulation of streamflows include autoregressive, Markov chain and moving average models. Time series analysis of hydrologic data is discussed. Pre: consent. (Alt. years)

NREM 691. Advanced Topics in NREM (1 – 4 depending on course) Study and discussion of significant topics and problems at an advanced level. Offered by visiting or existing faculty as a special course. Repeatable one time. Pre: graduate standing or consent.

NCTC courses online (Not offered every semester)

Introduction to R for Biologists (baseR) (2 or 3 Credits)

This course introduces the open source modeling and statistical analysis program, R. Students learn concepts on data management and manipulation in R, including extracting subsets of data, data splitting, data control structures, merging and combining data, sorting, ranking and ordering data and looping data in R. The class also introduces basics of graph construction in R, including scatter plots, line plots, bar charts, and histograms.

Species Distribution & Habitat Modeling Using R (sdhmR) (3 credits)

This course provides participants with skills for building species distribution and habitat models (SDHM) for use in management and conservation planning, and ecological study. Topics covered include: (i) formulation of intended SDHM use statements; (ii) data acquisition, organization, and vetting; (iii) model construction and prediction; (iv) assessment and evaluation; and (v) decision-risk associated with SDHM implementation. Participants will learn to apply these skills in R through hands-on exercises, with an intent to transfer the skills learned to a SDHM related to their work or research environment.

Aquatic Toxicology (3 Credits)

This class will emphasize aquatic toxicity. Students will learn about different types of toxicity testing (acute, early life state, chronic, freshwater, seawater, etc.), the environmental fate of contaminants (including transport and transformation processes, bioaccumulation, bioavailability, biochemical mechanism, fate modeling) and toxicological assessment (functional endpoints of ecosystem effects, federal acts and regulation, ecological risk assessments).

Principles of Modeling (2 or 4 Credits) (Grad students take 4 credits)

Introduction to a variety of modeling techniques applicable to resource management and conservation issues. Modeling topics include population models, decision analysis, and ecosystem models. The primary lecturer is world-renowned modeler and professor emeritus, Dr. Anthony (Tony) M. Starfield, who emphasizes practical and clear-thinking approaches to modeling challenges. Lectures are accompanied by spreadsheet “key-along” exercises, where spreadsheets are a tool for building a model. Course content can be browsed at:

<http://www.uvm.edu/rsenr/vtcfwru/spreadsheets/?Page=pom/pom.htm>

Conservation Biology and Modeling (3 Credits)

This online course will cover the crucial components of preserving biodiversity, primarily the ecological and evolutionary dimensions of conservation. Topics include: population growth, population viability analysis, metapopulation and source-sink dynamics, conservation genetics,

recognizing critical habitats, and reserve design. This learning experience combines video lectures, spreadsheet modeling development and use, virtual classroom discussions (which will be recorded if you are unable to attend), discussion forums, readings, and instructor interaction.

Fish Physiology: (3 Credits)

Fish Physiology will introduce students to the different systems of the fish (ie reproductive, endocrine) and how they interact.

Conference Room Students may use the department conference room located in Sherman 103 or class room located in Sherman 111 for seminar presentation or for meetings directly related to NREM such as thesis defense. Please be sure to make requests via the Google Form (<https://sites.google.com/a/hawaii.edu/nrem/nrem-room-equipment-reservation>). The key for the conference room can be picked up from the office and must be returned after you unlock the door.

Computers Many laboratories and the libraries on campus are equipped with personal computers for conducting research. NREM office computers are not for research and personal uses. CTAHR has its own computer lab and printing facility located in AgSci-215. See the link for lab use policies and access <https://cms.ctahr.hawaii.edu/it/Computing-Lab>.

Projectors and laptops are available for seminar presentations and NREM projects. Please be sure to reserve the equipment via the Google Form (<https://sites.google.com/a/hawaii.edu/nrem/nrem-room-equipment-reservation>).

Zoom NREM has an account with the videoconferencing service Zoom. You can get a call set up via the Google Form (<https://sites.google.com/a/hawaii.edu/nrem/zoom-requests>).

Fax Machine You may receive faxes related to NREM through the departmental fax machine. However, no personal faxing will be allowed.

Keys Graduate Assistants will be issued an office key at the time of hire with a deposit. Please do not loan your key to unauthorized persons. If you lose a key, please notify the NREM staff as soon as possible. You must return all keys when your affiliation with the NREM department ends and get your deposit back.

Laboratory and Field Equipment Laboratory and equipment needed for conducting research will be provided for all students by the department through their advisors.

Mailboxes You will be assigned a mailbox located in the department front office in Sherman 101. Check it daily for mail and other correspondence. The office is open from 7:45am – 11:45am and from 1:00pm – 4:45pm. Personal mail such as bank statements should be sent to your home address as the mailboxes are not secured.

Office Supplies Office supplies are not available for student use. However, some supplies are available for Graduate Assistants in relation to their departmental duties. Basic supplies for the offices of Graduate Assistants will be provided by the advisor.

Stationery & Shipping Supplies University of Hawai'i stationery is available for Graduate Assistants for correspondence in relation to their official duties and should be approved by their advisors.

- Outgoing packages should be prepared and labeled and brought to the NREM office.
- An account number (obtained from supervisor) must be provided in order for us to schedule a pick-up (for FedEx or UPS).
- An outgoing mailbox is available in the department front office for stamped letters or on-campus mail.
- You may use the departmental address for mail delivery related to NREM. However, you are responsible for pick-up of large and bulky packages.

Telephone Use Long distance calls are not permitted on University of Hawai'i telephones except for official business with advisor approval.

University Vehicles Only University of Hawai'i employees (including Graduate Assistants) with a valid Hawai'i driver's license may drive University vehicles.

To rent a vehicle:

- Obtain a Daily Rental Request Form from NREM office.
- Complete the form and phone in your vehicle reservation to Transportation Services at X68875.
- Return the form to NREM office so that it can be faxed to Transportation Services.
- The original will be returned to your mailbox.
- You must present the form to Transportation Services to obtain the vehicle.

Xerox Copies There is a departmental copy machine available in Sherman 101. Personal copies including class materials are 10 cents per page.

Desk Assignment There are limited desk spaces for graduate assistants in the department. Check with your advisor for desk space in her or his lab. If your advisor cannot accommodate you then the department will try to find a desk space for you in one of our graduate student offices. Please contact the Graduate Chair for a desk assignment. Sherman 201 is a common area for graduate students to hang out, study and print.

Student Organizations UH Mānoa Graduate Student Organization (GSO):

<http://gso.hawaii.edu/gso2/index.html>

- Every spring, a GSO representative of NREM must be nominated and elected. The GSO representative will work with the Graduate Chair and Departmental Chair to carry out the election for the next representatives.

Student Activity and Program Fee Board: www.hawaii.edu/sapfb/