

COASTAL MARINE SYSTEMS SCIENCE (CMSS)

CMSS 5340 Ocean Resources

3 Semester Credit Hours (3 Lecture Hours)

INVESTIGATION OF TOPICS RELATED TO THE DISCOVERY, DISTRIBUTION, AND EXPLOITATION OF MARINE RESOURCES OF THE OCEAN WITH A FOCUS ON THE GULF OF MEXICO, INCLUDING THE IMPACT OF RESOURCE EXPLOITATION ON BIOLOGICAL SYSTEMS, AND THE DEVELOPMENT OF MARINE POLICY.

CMSS 5392 Thesis I: Thesis Proposal

3 Semester Credit Hours (3 Lecture Hours)

THESIS STUDENTS MUST SUBMIT A COMPLETED PROPOSAL FOR THEIR THESIS PROJECT. A COURSE SECTION WILL BE CREATED FOR THE STUDENT TO ENROLL. UPON SUCCESSFUL COMPLETION AND SUBMISSION OF THE PROPOSAL SIGNED BY THE GRADUATE COMMITTEE OF THE STUDENT, STUDENTS MAY THEN REGISTER FOR CMSS 5393 THESIS RESEARCH. OPEN ONLY TO M.S. THESIS DEGREE CANDIDATES IN CMSS.

CMSS 5393 Thesis II: Thesis Research

3 Semester Credit Hours (3 Lecture Hours)

IMPLEMENTATION OF THE THESIS PROPOSAL, AND THE PRODUCTION OF A ROUGH DRAFT OF THE THESIS SUBMITTED TO THE GRADUATE COMMITTEE OF THE STUDENT FOR INITIAL EDITING AND COMMENT. A COURSE SECTION WILL BE CREATED FOR THE STUDENT TO ENROLL.

Prerequisite: CMSS 5392.

CMSS 5394 Thesis III: Thesis Submission

3 Semester Credit Hours (3 Lecture Hours)

COMPLETION OF THE FINAL DRAFT OF THE THESIS, SIGNED BY THE GRADUATE COMMITTEE OF THE STUDENT AND READY FOR BINDING AND DISTRIBUTION. A COURSE SECTION WILL BE CREATED FOR THE STUDENT TO ENROLL.

Prerequisite: CMSS 5393.

CMSS 5596 Directed Independent Study

1-5 Semester Credit Hours

STUDY IN AREAS OF CURRENT INTEREST. A TOTAL OF SIX SEMESTER HOURS OF DIRECTED INDEPENDENT STUDY MAY BE COUNTED TOWARDS THE CMSS M.S. DEGREE.

CMSS 5940 Thesis Project Research

1-9 Semester Credit Hours

RESEARCH RELATED TO THE CMSS M.S. THESIS PROJECT. OPEN ONLY TO M.S. STUDENTS IN CMSS WITH CONSENT OF THE GRADUATE ADVISOR. UP TO SIX HOURS MAY COUNT AS CREDIT TOWARD REGULAR GRADED (NON-RESEARCH, NON-VARIABLE CREDIT) ELECTIVE COURSEWORK FOR M.S. DEGREE REQUIREMENT IN COASTAL AND MARINE SYSTEM SCIENCE.

CMSS 6303 Natural Systems Analysis

3 Semester Credit Hours (3 Lecture Hours)

STATISTICAL ANALYSIS FOR DATA COLLECTED IN SEVERAL VARIABLES. TOPICS INCLUDE SAMPLING FROM MULTIVARIATE NORMAL DISTRIBUTION, MULTIVARIATE ANALYSIS OF VARIANCE, DISCRIMINANT ANALYSIS, PRINCIPLE COMPONENTS, AND FACTOR ANALYSIS.

Prerequisite: MATH 6315.

CMSS 6305 Natural Systems Modeling

3 Semester Credit Hours (3 Lecture Hours)

MODELING AND ANALYSIS OF DETERMINISTIC AND STOCHASTIC DYNAMICAL SYSTEMS, INCLUDING INVESTIGATION OF MODEL BEHAVIOR AND STABILITY. THEORY WILL BE APPLIED TO RESEARCH NATURAL ENVIRONMENTAL AND BIOLOGICAL SYSTEMS SUCH AS MULTI-SPECIES SYSTEMS, CARBON CIRCULATION IN THE BIOSPHERE, NUTRIENTS-PHYTOPLANKTON-ZOOPLANKTON MODELS, ETC.

Prerequisite: MATH 6315 and 6316.

CMSS 6307 Coastal and Marine Systems

3 Semester Credit Hours (3 Lecture Hours)

DESCRIPTION OF COASTAL AND OCEANIC ECOSYSTEMS TO PROVIDE AN OVERVIEW OF THE FUNDAMENTAL CONCEPTS OF THE ABIOTIC AND BIOTIC COMPONENTS, PHYSICAL-CHEMICAL PROCESSES, AND INTERACTIONS WITH ENVIRONMENTAL AND HUMAN SYSTEMS.

CMSS 6308 Coastal Geoenvironments and Change

3 Semester Credit Hours (3 Lecture Hours)

INVESTIGATIONS OF THE ORIGIN, CHARACTER, AND PROCESSES OF COASTAL GEOENVIRONMENTS WITH AN EMPHASIS ON TRACKING HISTORICAL AND PROJECTING FUTURE CHANGES, INCLUDING EXAMINATION OF THE INTERACTIONS OF GEOLOGICAL AND BIOLOGICAL PROCESSES AND IMPACTS OF HUMAN ACTIVITIES ON COASTAL DEPOSITIONAL SYSTEMS.

CMSS 6310 Fundamentals of Remote Sensing

3 Semester Credit Hours (3 Lecture Hours)

FUNDAMENTAL THEORY OF SATELLITE/AIRBORNE REMOTE SENSING TECHNIQUES, SENSOR PERFORMANCE AND CALIBRATION, AND THE SCIENTIFIC APPLICATIONS FOR LAND, OCEAN AND ATMOSPHERE OBSERVATIONS. TOPICS INCLUDE PHYSICAL PRINCIPLES OF REMOTE SENSING, RADIOMETRY, SENSORS AND SENSOR TECHNOLOGY FROM INFRARED TO MICROWAVE SENSING, AND SCIENTIFIC APPLICATIONS FOR LAND, OCEAN AND ATMOSPHERE OBSERVATIONS. CROSS LISTED WITH ESCI 6310.

CMSS 6312 Communicating Science Seminar

3 Semester Credit Hours (3 Lecture Hours)

COVERS COMMUNICATION TOPICS RANGING FROM PROPOSAL WRITING TO PROFESSIONAL PRESENTATIONS WITH A MINOR EMPHASIS ON ADDITIONAL NON-TRADITIONAL COMMUNICATION FORMATS. MUST BE TAKEN TO FULFILL DEGREE PLAN REQUIREMENTS BY ALL MARINE BIOLOGY GRADUATE STUDENTS AND IS RECOMMENDED IN THE FIRST SPRING OF THE DEGREE.

CMSS 6323 Experimental Design

3 Semester Credit Hours (3 Lecture Hours)

FUNDAMENTAL CONCEPTS OF MATHEMATICAL ECOLOGY AND THE DESIGN AND ANALYSIS OF ENVIRONMENTAL EXPERIMENTS. STUDENTS LEARN SAS PROGRAMMING AND PROCEDURES TO COMPUTE ECOLOGICAL METRICS, DATA MANAGEMENT TECHNIQUES, EXPLORATORY ANALYSIS, POWER, SAMPLE SIZE, CHECKING ASSUMPTIONS, AND ANALYSIS OF VARIANCE MODELS TO COMPUTE A PRIORI AND POST HOC HYPOTHESIS TESTS.

Prerequisite: MATH 6315.

CMSS 6327 Physical Oceanography**3 Semester Credit Hours (3 Lecture Hours)**

SUCCINCT REVIEW OF BASIC CONCEPTS OF PHYSICAL OCEANOGRAPHY FOLLOWED BY GENERAL PRESENTATIONS AND DISCUSSIONS IN THREE SELECTED AREAS: GLOBAL OCEAN CIRCULATION, CIRCULATION ALONG THE GULF OF MEXICO CONTINENTAL SHELF, AND OCEAN-ATMOSPHERE INTERACTION AND IMPACTS ON CLIMATE. A SIGNIFICANT PORTION OF THE CLASS IS BASED ON STUDENT GUIDED READING ASSIGNMENTS.

CMSS 6328 COASTAL OCEAN USING RMT SNS**3 Semester Credit Hours (3 Lecture Hours)****CMSS 6333 Paleo Systems****3 Semester Credit Hours (3 Lecture Hours)**

STUDY OF THE INTERRELATIONSHIPS OF ANCIENT ORGANISMS AND THEIR ENVIRONMENT THROUGH INTERPRETATION OF THE FOSSIL RECORD, ANALOG COMMUNITIES, AND OCEANOGRAPHIC DATA, SUCH AS CARBON AND OXYGEN ISOTOPES. THEORIES AND METHODS OF RECONSTRUCTING TERRESTRIAL, MARINE AND FRESHWATER BIOTIC COMMUNITIES AND ENVIRONMENTS. REVIEW OF CLASSIC PALEOECOLOGICAL AND PALEOCEANOGRAPHIC STUDIES AS WELL AS CURRENT RESEARCH.

Prerequisite: BIOL 3428 and GEOL 1401 and (ESCI 3351 or GEOL 4316).

CMSS 6334 Geological Oceanography**3 Semester Credit Hours (3 Lecture Hours)**

INTEGRATED EXAMINATION OF THE GEOLOGY AND GEOCHEMISTRY OF THE MARINE ENVIRONMENT. EVOLUTION OF OCEAN BASINS, CONTINENTAL MARGINS AND PLATE BOUNDARIES; GEOLOGY OF OCEANIC CRUST; CONTROLS ON THE TYPES, ORIGIN, AND DISTRIBUTION OF MARINE SEDIMENTS; AND INTRODUCTION TO PALEOCEANOGRAPHY.

Prerequisite: ESCI 3351 or GEOL 4316.

CMSS 6340 OCEAN RESOURCES**3 Semester Credit Hours (3 Lecture Hours)****CMSS 6352 Environmental Forecasting****3 Semester Credit Hours (3 Lecture Hours)**

STATISTICAL TECHNIQUES (CLASSIC AND BAYESIAN) AND NEW ARTIFICIAL INTELLIGENCE BASED TECHNIQUES, SUCH AS NEURAL NETWORKS, FOR THE ANALYSIS OF ENVIRONMENTAL SYSTEMS WITH LARGE DATASETS.

Prerequisite: CMSS 6305.

CMSS 6357 Global Geochemical Cycles and Change**3 Semester Credit Hours (3 Lecture Hours)**

INTEGRATED EXAMINATION OF GLOBAL-SCALE GEOCHEMICAL CYCLES OPERATING WITHIN AND BETWEEN THE FOUR COMPONENTS OF THE EARTH SYSTEM (ATMOSPHERE, HYDROSPHERE, BIOSPHERE, AND SOLID EARTH) AND THEIR ROLE IN THE EVOLUTION OF OUR PLANET.

Prerequisite: CHEM 1411, 1412 and 3411.

CMSS 6358 Ocean and Estuarine Acidification**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE FOCUSES ON INTRODUCING THE CONCEPT OF ACIDIFICATION OF MARINE ECOSYSTEMS (ESTUARIES AND OCEANS) AND BIOLOGICAL AND ECOLOGICAL RESPONSES TO THE ACIDIFICATION; THE GEOLOGICAL PAST WILL ALSO BE EXAMINED IN THE CONTEXT OF CURRENT OCEAN ACIDIFICATION. NUMERICAL SIMULATIONS USING THE SOFTWARE CO2SYS AND INTERPRETATION OF OPEN-ACCESS GLOBAL DATABASES ON GLOBAL OCEAN AND ESTUARINE ACID-BASE DYNAMICS WILL BE INTRODUCED IN THIS CLASS.

Prerequisite: (CHEM 1411 and 1412).

CMSS 6359 Marine Ecosystem Dynamics**3 Semester Credit Hours (3 Lecture Hours)**

INVESTIGATION OF THE INTERACTIONS BETWEEN ORGANISMS AND PHYSICAL PROCESSES THAT REGULATE MARINE ECOSYSTEM FUNCTIONS.

CMSS 6360 COMPUTER PROGRAMMING IN EARTH SYSTEM SCIENCES**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE IS TO ENHANCE THE PROGRAMMING SKILLS OF GRADUATE STUDENTS UNDER VARIOUS SCIENTIFIC PROGRAMMING ENVIRONMENTS. THE FOCUS IS ON THE DATA ANALYSIS AND PROBLEM-SOLVING USING PYTHON, R, MATLAB AND IDL. THE CONTENTS OF THE COURSE INCLUDE THE BASIC CONCEPTS OF THE OPERATING SYSTEMS AND HIGH-LEVEL PROGRAMMING LANGUAGES, BASICS OF PROGRAMMING IN PYTHON, GENERAL DATA ANALYSIS METHODS AND TOOLS, COMMON SCIENTIFIC DATA FORMATS, PUBLICATION QUALITY SCIENTIFIC GRAPHICS, THE CRITICAL STEPS OF BUILDING A LARGE PROGRAMMING PROJECT.

CMSS 6362 Global Change and Its Impact on Aquatic Ecosystems**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE WILL INTRODUCE STUDENTS TO THE EFFECTS OF CLIMATIC AND ANTHROPOGENIC CHANGE ON AQUATIC ECOSYSTEM STRUCTURE AND FUNCTION. INCLUDES READINGS FROM THE CURRENT LITERATURE AND DEVELOPMENT OF A RESEARCH PROPOSAL. CROSS-LISTED WITH MARB 6362.

CMSS 6370 COASTAL MANAGEMENT AND OCEAN LAW**3 Semester Credit Hours (3 Lecture Hours)**

INTENSIVE STUDY OF THE 1972 NATIONAL COASTAL ZONE MANAGEMENT ACT AND SUBSEQUENT COASTAL MANAGEMENT PROGRAMS. THE TEXAS PROGRAM, WHICH IS ADMINISTERED BY THE GENERAL LAND OFFICE, WILL BE DEALT WITH IN DEPTH AS THE CENTRAL FOCUS OF THE COURSE. STATUTORY LAW RELATING TO CITIZEN, STATE, AND FEDERAL RIGHTS AND DUTIES AS THEY IMPACT COASTAL AND MARITIME LAW WILL BE STUDIED INCLUDING APPLICABLE TEXAS REAL PROPERTY LAW. STUDENTS WILL USE CASE LAW STUDIES RELATING TO THOSE RIGHTS AND DUTIES AND PUBLIC TRUST DOCTRINE CASES TO GAIN AN INTEGRAL PART OF UNDERSTANDING THE RESPONSIBILITIES OF GOVERNMENTS AND RIGHTS OF CITIZENS.

CMSS 6372 Environmental Sustainability Economics**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE WILL INTRODUCE THE FUNDAMENTAL CONCEPTS OF NEOCLASSICAL MICROECONOMICS AND ECOLOGICAL ECONOMICS AND APPLY THEM TO ENVIRONMENTAL AND SUSTAINABILITY ISSUES.

CMSS 6399 Ph.D. DISSERTATION**3 Semester Credit Hours (3 Lecture Hours)**

Ph.D. dissertation research. A total of twelve semester hours must be successfully completed to meet Ph.D. degree requirements. Normally the hours will be taken for each of the four major stages in the dissertation process: written dissertation proposal, research phase, draft dissertation phase, and final approved copy phase. Open only for Ph.D. Dissertation Candidates in Coastal and Marine System Science

CMSS 6401 Mathematical Concepts for System Science**4 Semester Credit Hours (4 Lecture Hours)**

COURSE FOCUSED ON CALCULUS, LINEAR ALGEBRA, AND DIFFERENTIAL EQUATIONS USED IN COASTAL, MARINE, AND ENVIRONMENTAL SETTINGS. THE COURSE IS DESIGNED FOR ENTERING DOCTORAL STUDENTS IN THE CMSS PROGRAM AS WELL AS OTHER INTERESTED SCIENCE GRADUATE STUDENTS OF THE COLLEGE OF SCIENCE AND ENGINEERING. COURSE CONCEPTS ARE APPROACHED WITHIN THE CONTEXT OF COASTAL AND MARINE SYSTEMS.

Prerequisite: (MATH 1342 or 1442) and MATH 2413.

CMSS 6590 Advanced Topics**1-5 Semester Credit Hours (1-5 Lecture Hours)**

AN ADVANCED STUDY OF AN ENVIRONMENTAL SYSTEMS TOPIC. MAY BE REPEATED WITH FULL CREDIT IN ANOTHER AREA OF ENVIRONMENTAL SYSTEMS.

CMSS 6596 Directed independent Study**1-5 Semester Credit Hours**

STUDY IN AREAS OF CURRENT INTEREST. A TOTAL OF SIX SEMESTER HOURS OF DIRECTED INDEPENDENT STUDY MAY BE COUNTED TOWARDS THE PH.D. DEGREE.

CMSS 6699 DISSERTATION DEFENSE**6 Semester Credit Hours (6 Lecture Hours)****CMSS 6940 DISSERTATION PROJECT RESEARCH****1-9 Semester Credit Hours (1-9 Lecture Hours)**

Research related to Ph.D. dissertation project. Open only to degree candidates in Coastal and Marine Systems Science with consent of the graduate advisor. Course is taken as credit/non-credit and may be repeated.

CMSS 6996 Research**1-9 Semester Credit Hours (1-9 Lecture Hours)**

INDEPENDENT RESEARCH CONDUCTED UNDER SUPERVISION OF AN ADVISOR. OPEN TO COASTAL AND MARINE SYSTEM SCIENCE STUDENTS WHO HAVE NOT YET PASSED THE QUALIFYING EXAM AND WITH CONSENT OF THEIR GRADUATE ADVISOR. THE COURSE IS GRADED WITH AN S OR U, AND MAY BE REPEATED.

CMSS 6998 Dissertation Research**1-9 Semester Credit Hours (1-9 Lecture Hours)**

RESEARCH RELATED TO PH.D. DISSERTATION PROJECT. OPEN ONLY TO DEGREE CANDIDATES HAVING PASSED THE QUALIFYING EXAM IN COASTAL AND MARINE SYSTEM SCIENCE WITH CONSENT OF THEIR GRADUATE ADVISOR. THE COURSE IS GRADED WITH AN S OR U, AND MAY BE REPEATED.

CMSS 6999 Dissertation Defense**3-9 Semester Credit Hours**

OPEN ONLY TO DEGREE CANDIDATES IN COASTAL AND MARINE SYSTEM SCIENCE WITH CONSENT OF THEIR GRADUATE ADVISOR. STUDENTS SHOULD ENROLL IN THIS COURSE DURING THE LAST SEMESTER OF THE CMSS PHD PROGRAM. TO SUCCESSFULLY COMPLETE THIS COURSE THE STUDENT MUST PASS THE DISSERTATION DEFENSE AS WELL AS HAVE A FINAL COPY OF THE DISSERTATION SIGNED BY THE FULL GRADUATE COMMITTEE AND APPROVED FOR BINDING AND DISTRIBUTION. A COURSE SECTION WILL BE CREATED FOR THE STUDENT TO ENROLL. A GRADE OF CREDIT/NO CREDIT WILL BE ASSIGNED FOR THE CLASS WITH THE POSSIBILITY TO ASSIGN THE GRADE OF IP OR IN PROGRESS. IF A GRADE OF IP IS ASSIGNED, THE COURSE MUST BE REPEATED THE FOLLOWING SEMESTER(S) UNTIL THE COURSE IS PASSED.