**OCNG - OCEANOGRAPHY (OCNG)**

**OCNG 203 Communicating Oceanography Laboratory**  
Credit 1. 2 Lab Hours.  
Learn and practice basic writing skills for ocean science; basic background on the research being conducted in the Department of Oceanography through seminars given by Oceanography graduate students.

**OCNG 251 Oceanography**  
Credits 3. 3 Lecture Hours.  
(GEOL 1345, GEOL 1445) Oceanography. Overview of the ocean environment; interrelation of the subdisciplines of ocean sciences; importance of the oceans to human beings; human impact on the oceans.

**OCNG 252 Oceanography Laboratory**  
Credit 1. 2 Lab Hours.  
(GEOL 1145, GEOL 1445) Oceanography Laboratory. Hands-on laboratory experiments and exercises demonstrating principles of ocean sciences; emphasis on the unique interdisciplinary nature of the ocean and current ocean issues relevant to today’s society. Honors sections and contracts are also available.

**OCNG 281 Seminar**  
Credit 1. 1 Lecture Hour.  
Basic background on the research being conducted in the Department of Oceanography through seminars given by Oceanography graduate student; basic writing skills for ocean science through instruction and assignments during the semester.  
Prerequisites: OCNG 251 or OCNG 401; OCNG 252; or approval of instructor.

**OCNG 291 Research**  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in oceanography. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

**OCNG 303 Professional Communication in Oceanography**  
Credits 3. 3 Lecture Hours.  
Exploration of the fundamental skills required for effective communication of various forms of writing and for oral presentations of various lengths and purposes; addresses preparation for various ocean science-related careers.  
Prerequisite: OCNG 203, COMM 203 or COMM 205, junior or senior classification or approval of instructor.

**OCNG 350 Marine Pollution**  
Credits 3. 3 Lecture Hours.  
Sources and fates of marine pollutants; types of pollutants including plastics, oil and sound; impact of pollution on society.  
Prerequisite: Junior or senior classification or approval of instructor.

**OCNG 401 Interdisciplinary Oceanography**  
Credits 3. 3 Lecture Hours.  
Quantitative survey of interdisciplinary relationships between biological, chemical, geological/geophysical and physical aspects of the ocean. Honors section also available.  
Prerequisites: MATH 131, MATH 151, or MATH 171; junior or senior classification; or approval of instructor.

**OCNG 404 Ocean Observing Systems**  
Credits 3. 3 Lecture Hours.  
Investigate the rationale behind ocean observing systems; familiarize with the relevant social, scientific design, technology and policy issues associated with observing systems.  
Prerequisite: OCNG 251 or OCNG 401 or approval of instructor.

**OCNG 410 Physical Oceanography**  
Credits 3. 3 Lecture Hours.  
Elements of the physics of the sea; descriptive aspects as well as cause and effect relations in respect to currents, thermal structure and waves. Intended for majors in the physical sciences or engineering.  
Prerequisites: MATH 152; junior or senior classification.

**OCNG 420 Biological Oceanography**  
Credits 3. 3 Lecture Hours.  
Biological aspects of the marine environment; marine organisms; productivity of the sea; marine pollution and fouling; use of the sea.  
Prerequisites: BIOL 112 or OCNG 251; junior or senior classification.

**OCNG 425 Microbial Oceanography**  
Credits 3. 3 Lecture Hours.  
Diversity and ecology of microorganisms in the ocean; role in the Earth system both in the contemporary ocean and the geological past.  
Prerequisites: Junior or senior classification, OCNG 251, or OCNG 401, or approval of instructor.

**OCNG 430 Geological Oceanography**  
Credits 3. 3 Lecture Hours.  
History of Oceanography; physiographic provinces of the oceans, their origins and sediments; geological sampling techniques and geophysical methods; coasts and beaches, paleoceanography; global tectonics.  
Prerequisites: OCNG 251 or OCNG 401 or GEOL 101 or GEOL 104 or GEOG 203, junior or senior classification.

**OCNG 440 Chemical Oceanography**  
Credits 3. 3 Lecture Hours.  
Chemical aspects of the marine environment; biogeochemical cycles of organic and inorganic constituents; primary productivity, the carbon dioxide system, nutrient cycles, stable and radioactive isotopes in the sea.  
Prerequisites: CHEM 102 or CHEM 104; junior or senior classification; sophomore with approval of instructor.

**OCNG 443 Oceanographic Field and Laboratory Methods**  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Development of skills needed to collect, prepare and analyze oceanographic samples; perform data analysis, interpretation and reporting for common oceanographic analyses.  
Prerequisite: MATH 152, CHEM 102, junior or senior classification or approval of instructor.

**OCNG 451 Mathematical Modeling of Ocean Climate**  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Problem-based course in theoretical and computer techniques applied to mathematical solutions of ocean climate, including ocean circulation, climate variability, El Niño.  
Prerequisite: MATH 308 or MATH 451.
OCNG 453 Hydrothermal Vents and Mid-Ocean Ridges  
Credits 3. 3 Lecture Hours.  
Exploration of the creation of various types of hydrothermal fluids, the associated chemical behavior of vent and plume fluids, and the ecology of hydrothermal vent systems; emphasis on the interdependence of the geological, chemical, and biological aspects of hydrothermal systems.  
Prerequisite: OCNG 251 or OCNG 401, junior or senior classification or approval of instructor.

OCNG 456 MATLAB Programming for Ocean Sciences  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Computation techniques for oceanographic data processing using MATLAB; focus on the analysis of oceanographic-related data sets and real-world oceanographic applications; analyze individual data sets.  
Prerequisite: Junior or senior classification or approval of the instructor.

OCNG 461 Advanced Oceanographic Data Analysis and Communication  
Credits 3. 3 Lecture Hours.  
Project design and planning for oceanographers; oceanographic data organization and analysis; synthesis and interpretation of data analysis; technical report writing and presentation.  
Prerequisites: OCNG 281, OCNG 404, OCNG 410, and GEOS 470, or approval of the instructor.

OCNG 469 Python for Geosciences  
Credits 3. 3 Lecture Hours. 1 Lab Hour.  
Core language Python programming, scientific programming analysis methods, analysis of large geophysical data sets, plotting geophysical data, interpolation.  
Prerequisite: Junior or senior classification.

OCNG 481 Seminar  
Credit 1. 1 Lecture Hour.  
Analysis, review and critique of current research themes in oceanography based on reading assignments and seminar presentations. May be taken four times for credit.  
Prerequisite: Junior or senior classification.

OCNG 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special reading assignments, problems and discussion on oceanographic topics of mutual interest to student and instructor.  
Prerequisites: OCNG 251 or OCNG 401 or approval of instructor. An honors section is also available.

OCNG 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of oceanography. May be taken two times for credit.  
Prerequisite: OCNG 251 or OCNG 401 or approval of instructor. An honors section is also available.

OCNG 491 Research  
Credits 0 to 9. 0 to 9 Other Hours.  
Research conducted under the direction of faculty member in oceanography. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor. An honors section is also available.