



| Sunday  | Monday   | Tuesday   | Wednesday  | Thursday  | Friday   | Saturday  |
|---|--|---|--|---|--|---|
| 4   | 5  | 6   | 7  | 8   | 9  | 10  |
| <p><b>Week 1</b><br/>Intro to Ecosystems Science</p> <p><b>Noon: Picnic Welcome &amp; Orientation</b><br/>14:30 Starr 209 (classroom)<br/>Pick up books, lab, field gear<br/>Introduction to MBL Computer Network</p> | <p>8:30 Starr 209 Intro to Core Course</p> <p>08:45-10:00 Giblin Earth as an Ecosystem: 4 Billion years of Biogeochemistry</p> <p>10:30-17:00 Lb 208 Neill <b>Field Day: Forest Biomass</b></p>  | <p>8:30-10:00 Melillo How Humans are Altering the Earth as an Ecosystem: The Global Carbon Cycle</p> <p>10:15-noon Elective</p> <p>13:30-17:00 Neill Lb 208 <b>Lab Forest Biomass Analysis</b></p>                                      | <p>8:30 Ducklow Effects of Climate Change in the Antarctic</p> <p>10:30-17:00 Foreman Lb 208 <b>Field Day: Aquatic Biomass Lab</b></p> <p>Return Optional field trip selections form to SES office</p>   | <p>8:30 Shaver The Ecosystem Concept &amp; Major Themes of Ecosystem Studies</p> <p>10:15-noon Elective</p> <p>13:30-17:00 Foreman Lb 208 <b>Aquatic Lab Biomass Analysis</b></p>   | <p>8:30-12:00 Shaver Foreman <b>Biomass Calculation discussion &amp; synthesis.</b></p> <p>Students introduced to Center staff at Donuts. Distribute lab report guidelines Wks 1-3)</p> <p>14:30-15:30 Library Orientation</p> <p>15:30-16:30 Safety Lecture MBL J. Marcello (Starr 209)</p> | <p><b>WHALE WATCH (SAT OR SUNDAY)</b></p>  <p>Depart SWOPE 09:00 for Provincetown, noon cruise return for dinner</p> |
| 11  | 12   | 13  | 14   | 15  | 16   | 17  |
| <p><b>Week 2</b><br/>Ecosystem Primary Production</p>   | <p>08:00 Wk 1 Biomass problem set due</p> <p>08:30-10:00 Shaver Carbon Balance: Photosynthesis and Primary Production in Land based Ecosystems</p> <p>10:30-17:00 Shaver- <b>Field Day: Leaf level CO<sub>2</sub> flux measurements from FSTP forest</b></p> | <p>08:30 Foreman Aquatic Primary Production</p> <p>10:15-noon Elective</p> <p>13:30-17:00 Shaver - <b>Lab: NPP from tree cores; leaf areas and data work up</b></p>   | <p>08:30 Shaver Ecosystem &amp; Net Primary Production at regional to global scales – controls on carbon balances</p> <p>10:30-17:00 Shaver <b>Terrestrial Field Day; FWTP Tour and Orientation</b></p>  | <p>08:30-10:00 Liles - <b>Writing Seminar</b></p> <p>10:15-noon Elective</p> <p>13:30 -17:00 Shaver- <b>Data work-up; NPP &amp; GPP Calculations</b></p> <p>Return Wk 1 Problem Set</p>   | <p>08:30-noon Neill/Foreman <b>Student led Presentations: Terrestrial &amp; Aquatic Ecosystem Primary Producer Biomass</b></p> <p>Distribute problem set on terrestrial Primary Production</p> <p>13:00-14:00 Staff Mtg.</p> <p>DSS Scott Doney, WHOI Ocean Acidification</p>                |   |
| 18  | 19   | 20  | 21   | 22  | 23   | 24  |
| <p><b>Week 3</b><br/>Fate of Organic Matter Produced on Land and Water</p>   | <p>0800-noon Lb 208 Foreman <b>Aquatic Lab / Field Day</b> Primary production. Collect incubate &amp; fix initial water samples Extract Chl a; Pack CHN from biomass Lab (Wk 1)</p> <p>17:00 Terrestrial Primary Prod. Prob. Set due</p>                     | <p>08:30 Shaver Environmental Variation, Ecosystem Distribution &amp; Feedbacks</p> <p>10:15-noon Elective</p> <p>13:30 Foreman <b>Aquatic Primary Production Lab.</b> Titrate bottles; Start calculations; Pack CHN, Measure Chl a</p> | <p>08:30 Melillo Litter Decomposition &amp; Fate of Organic Matter on Land.</p> <p>13:30 Foreman <b>Aquatic Primary Production Lab</b> Calculate daily rates of GPP, R, NCP; Scale to pond / bay. Run CHN on filters; finish data work-up.</p> | <p>08:30-Tang Measuring soil respiration &amp; energy balance in soil/plant systems</p> <p>10:15-noon Elective</p> <p>13:30 <b>Lab work-up Data:</b> Complete calculations &amp; presentations Aquatic Primary Production</p>             | <p>08:30 -11:45 Shaver/Foreman (Starr 209) Students present &amp; discuss results of Primary Production Lab, Contrast P/B on Land and Water</p> <p>14:00 - 15:30 Liles - <b>Writing Seminar</b></p>  | <p><b>ISLAND FIELD TRIP (OPTIONAL)</b></p> <p>Depart. For Plum Island Friday afternoon. Return Saturday late afternoon/ evening</p>   |
| 25  | 26   | 27  | 28   | 29  | 30   | 1   |
| <p><b>Week 4</b><br/>Fate of Organic Matter in Ecosystems &amp; Secondary Production</p>  | <p>0800 <b>Aquatic Primary Prod Lab Report due</b></p> <p>8:30-10:00 Deegan Secondary Production &amp; Ecol. Efficiency.</p> <p>10:30-17:00 Deegan <b>Field Day</b> Trophic structure in Aquatic systems: collecting biota WFH, Waquoit, Johns Pond</p>      | <p>08:30-10:00 Peterson Use of Isotopes to Study Ecosystems.</p> <p>10:15-noon Elective</p> <p>13:30-17:00 Deegan <b>Lab Day</b> sorting, identifying &amp; counting organisms from Aquatic sites</p>                                   | <p>08:30 Hobbie Decomposer Organisms</p> <p>13:30-17:00 Deegan <b>Lab Day</b> Finish sorting, ID and counts; begin calculations.</p>   | <p>08:30 Conte Decomposition &amp; Fate of Organic Matter in Aquatic Systems</p> <p>10:15-noon Elective</p> <p>13:30 Deegan <b>Lab</b> Grind samples for isotope analysis, complete trophic pyramids of numbers, biomass, production.</p> | <p>8:30-noon Deegan <b>Student-Led Discussion &amp; Synthesis Secondary Production &amp; Trophic Pyramids.</b> Choose samples for Isotope Analysis</p> <p>13:00-14:00 Staff Mtg.</p> <p>DSS Ed DeLong, MIT Genomes to Biomes</p>   |   |

## SES PROGRAM CALENDAR – OCTOBER 2011

| Sunday  | Monday   | Tuesday   | Wednesday   | Thursday  | Friday   | Saturday  |
|---|--|---|---|---|--|---|
| 2   | 3  | 4   | 5   | 6   | 7  | 8   |
| <b>Week 5</b><br>Ecosystem Stoichiometry and Biogeochemistry  | 08:00 Lab Rpt Due<br><b>Trophic Pyramids</b><br>08:30-10:00 Giblin Decomposition, Aerobic / Anaerobic Respiration, Redox Chemistry.<br>10:30-17:00 Tang<br><b>Terrestrial. Field Day</b> – Soil pits, soil respiration, collect N-mineralization bags  | 08:30 Giblin The Nitrogen Cycle<br>10:15-noon Elective<br>13:30-17:00 Tang<br><b>Terrestrial. Lab - Prepare soil for C/N, pack wood and foliage, extract soils for N-mineralization estimate</b><br>Distribute Mid term Study Questions       | 08:30 Giblin The Phosphorus Cycle<br>10:30-17:00 Giblin<br><b>Aquatic Field Day</b> Collect W. Falmouth Harbor & Waquoit Bay sediment cores; Siders Pond /Johns Pond water column profiling.                                      | 08:30 Giblin N vs P limitation; element cycle feedbacks<br>10:15-noon Elective<br>13:30 Giblin<br><b>Aquatic Lab Day</b> Run core incubations. Analysis of Pond samples. Prepare sediments & soils for C/N analysis | 08:30 –12:00 Foreman / Giblin<br>Lab nutrient analysis (NO <sub>3</sub> , NH <sub>4</sub> , PO <sub>4</sub> ) on water samples and soil (KCL) extracts<br>13:00-14:00 Staff Mtg.<br>13:30 –15:00 Liles Writing Seminar |   |
| 9   | 10   | 11  | 12  | 13  | 14   | 15  |
| <b>Week 6</b><br>Nitrogen and Phosphorus Cycling & Budgets  |  <p><b>COLUMBUS DAY</b><br/>DAY OFF</p>  | 08:30 Peterson Ecosystem Stoichiometry<br>10:15-noon Elective<br>13:30–17:00 Foreman/ McHorney<br>LAB: Run CHN on foliage, wood, soils, sediments; soil respiration calculations  | 8:30 –10:00 Liles Writing Seminar<br>10:30- 11:30 Foreman, TA's<br><i>Group discussion of project ideas</i><br>13:30-17:00 Tang<br>Calculate N & C stocks in soils, trees & litter; Soil Respiration and Nitrogen Mineralization; | 8:30 Giblin Acid Deposition, ion exchange and charge balance<br>10:15-noon Elective<br>13:30 Giblin<br>Calculations of core fluxes, sediment CHN & water column nutrients   | 08:30-Noon<br><b>OPTIONAL Q &amp; A for Midterm exam; review problems</b><br>13:00 – Due 1 <sup>st</sup> Draft Project Proposal<br>DSS<br>Bridget Emmett CEH, Bangor, UK<br>Changing Soils & Ecosystem Service         |   |
| 16  | 17   | 18  | 19  | 20  | 21   | 22  |
| <b>Week 7</b><br>Land-Water Interactions<br><br><i>Note: Meet with possible project mentors during next 2 weeks</i> | <b>08:00-12:00 MID-TERM EXAM</b>   | 08:30 Foreman Eutrophication & Coastal Nutrient Pollution<br>10:15-noon Elective<br>13:30-17:00 Giblin/ Tang (Starr 209)<br>Student presentation/ discussion of results from Week 5-6 ecosystem stoichiometry and fate of organic matter Lab. | 08:30 Neill The Hubbard Brook Watershed Story.<br>08:00 Report due Ecosystem Stoichiometry & Fate OM<br>10:30-17:00 Foreman/McHorney<br>Nutrient / Water Budget Lab Sample ground-water & streams, MASSTC                         | 08:30 Neill Deforestation in the Tropics.<br>10:15-noon Elective<br>13:30 Neill H <sub>2</sub> O / Nutrient Budget<br>Lab Sampling soil solution-water at FWTP.   | 08:30 -12:00 Foreman H <sub>2</sub> O / Nutrient Budget<br>Lab Anthropogenic Loading (Land Use Mapping)<br><br>13:30-15:00 Liles Writing Seminar   |   |
| 23  | 24   | 25  | 26  | 27  | 28   | 29  |
| <b>Week 8</b><br>Current Issues in Ecosystems Science   | 08:00 – Project 2 <sup>nd</sup> Draft Proposal Due<br>08:30 Giblin Human Alteration of Global Element Cycles<br><br>13:30-17:00 Foreman/McHorney<br>Lab H <sub>2</sub> O Budget & Nutrients - analysis of NO <sub>3</sub> , NH <sub>4</sub> & PO <sub>4</sub> in precip., lysimeters, wellpoints, etc. | 08:30 Peterson Surprises from Greenhouse Gas Buildup: Abrupt Climate Change and the Pan-Arctic Water Balance<br><br>10:15 Elective<br>13:30-17:00 Foreman/Neill<br>Nutrient Analysis Discussion and Calculations                              | 08:30 Neill Loss of "Ecosystem Services".<br>13:30-17:00 McHorney / Neill –<br>Water Nutrient Budget Lab – Calculations of water balance  | 08:30-10:00 Liles Writing Seminar<br>10:15- Elective<br>13:30-17:00 Neill / Foreman<br>Calculation of Nutrient Budgets Applied Science Scenarios  | 08:30-noon Neill / Foreman<br>Water Nutrient Budget Lab Student discussion and presentations.<br>13:00-14:00 Staff Mtg.<br>DSS<br>Kevin McCann U. Guelph, Canada<br>Biodiversity & Food Webs                           | Cape Cod Marathon Relay<br>Sunday 30 Oct<br>Students vs. Faculty<br><br> |

**SES PROGRAM CALENDAR – OCTOBER/NOVEMBER/DECEMBER 2011**

| Sunday   | Monday  | Tuesday   | Wednesday   | Thursday  | Friday  | Saturday  |
|--|---|---|---|---|---|---|
| 30<br><br><b>Week 9</b><br>What Species Do in Ecosystems<br><br><i>Faculty Challenge Reunion Picnic</i> | 31<br><br>08:00 <b>Cross-System Flux Lab Report due.</b><br>Return Draft Project Proposal.<br>08:30 Deegan<br>What species do in Ecosystems<br>13:30-17:00<br>Deegan Lab Isotopes and Food Web Data Work-up | 1<br><br>08:30 Deegan<br>Resource & Predation Controls on Production.<br>10:15 Elective<br>13:30-17:00<br>Deegan Lab Isotopes and Food Web Data Work-up.<br>Distribute Study Question for Final<br>Cross-System Flux Lab Rpt Due; | 2<br><br>08:30 Deegan<br>Nutrient Transport by Animals.<br>Report Preparation<br>Project work<br><br>15:00-17:30 Liles<br>Writing Seminar | 3<br><br>08:30 Deegan<br>Ecosystems Assessment of Fisheries Exploitation<br>10:15 Elective<br>13:30-17:00<br>Deegan<br>Lab: Student Presentations & Discussion Isotope / Food Web | 4<br><br>08:00-12:30<br>Students present project proposals and preliminary data<br>13:00-14:00 Staff Mtg.<br>14:00-17:00<br>Q&A, Final Exam Review (optional) | 5<br><br>Trip to New England Aquarium<br><br>Dinner in Boston |
| 6<br><br>Week 10<br>Current Issues in Ecosystems<br>Science cont'd.<br>CERF Mtg Starts<br>DAYLIGHT SAVINGS TIME ENDS   | 7<br><br>8:00 Final Written Project Proposal Due<br><br>CERF  | 8<br><br>10:15 Elective<br><br>13:00-17:30<br><b>FINAL EXAM</b><br><br>CERF   | 9<br><br>10:30-11:30 Staff Mtg.<br>Project Work<br><b>CERF</b>  | 10<br><br>8:30-10:00 Liles - Writing Seminar<br>10:15 Elective<br><b>CERF Mtg Ends</b><br>Project Work<br>Veteran's Day   | 11<br><br>Project Work  | 12  |
| 13<br><br>Week 11  | 14<br><br>Project Work<br>08:30-9:30 Staff Mtg.   | 15<br><br>Project Work  | 16<br><br>Project Work  | 17<br><br>Project Work<br>15:30-17:00 Liles<br>Writing Seminar  | 18<br><br>Project Work<br>DSS<br>Robert Twilley<br>U. Louisiana   | 19  |
| 20<br><br>Week 12  | 21<br><br>Project Work  | 22<br><br>8:30-10:00 Liles<br>Writing Seminar<br>Final Paper Due<br>Project Work  | 23<br><b>Thanksgiving</b>                             |   | 24<br><b>Break</b>  |   |
| 27<br><br>Week 13  | 28<br><br>Project Work<br>16:00-17:00 Staff Mtg.  | 29<br><br>Project Work  | 30<br><br>Project Work<br>HANUKKAH BEGINS AT SUNDOWN  | 1<br><br>Project Work<br>15:30-17:00 Liles-<br>Writing Seminar  | 2<br><br>Project Work   | 3   |
| 4<br><br>Week 14   | 5<br><br>Project Work<br>13:00 Project Progress Rpt Due   | 6<br><br>Project Work<br>16:00-17:00 Staff Mtg.   | 7<br><br>Project Work   | 8<br><br>Project Work   | 9<br><br>Project Work   | 10  |
| 11<br><br>Week 15  | 12<br><br>Project Work<br>08:30 Independent Project DRAFT Report Due  | 13<br><br>Project Work  | 14<br><br>Project Work<br>17:00 Draft Project Report Returned   | 15<br><br>Project Work  | 16<br><br>Student Research SYMPOSIUM<br>Oral Project Reports  | 17  |
| 18<br><br>Week 16  | 19<br><br>09:00 FINAL Written Project Report Due<br>End of Course Check out   | 20  | 21  | 22  | 23  | 24<br><br><i>Merry Christmas &amp; Happy Hanukkah</i>         |