

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

CURRICULUM IN ENVIRONMENT AND ECOLOGY

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Dr. Abigail Panter, Senior Associate Dean for Undergraduate Education UNC-CH College of Arts and Sciences

Dear Dr. Panter:

The Curriculum in Environment and Ecology would like to revise the undergraduate majors offered in our program to include a Sustainability track in the Environmental Studies, B.A., and a Quantitative Energy Systems track in the Environmental Sciences, B.S. These changes are proposed in response to student demand in these areas, as demonstrated by their interests in sustainable resources and in energy. Our major enrollment has increased by 50% in the last decade, and with the increasing pressures placed on natural resources and sustainable energy, we anticipate this trend will remain steady over the next 5 years. Additionally, we now have a dual degree program in Environment and Science Communication with the School of Media and Journalism, to which students are increasingly attracted. It has served as a unique recruitment model for our undergraduate program as well as for the School of Media and Journalism graduate program. We recently began a dual degree in Environmental Informatics with the School of Information and Library Sciences, and we have another proposed dual degree is under development with the School of Government's master's in public administration. We have also created some pathways in collaboration with the Department of Physics and Astronomy to engage more of our environmental science majors in their BA in energy physics. As our enrollment has increased, we also recognize that student demand in core courses will increase. The creation of tracks helps us distribute the instructional load and minimizes bottlenecks in certain core courses, thus making it more efficient for the students.

All proposed changes to our majors are designed to enhance the utility and effectiveness of our environmental degrees within the context of a changing world. We design these changes around a set of foundational core courses, skills courses, and selection of courses from a set of concentrations. The total number of courses in the core requirement is now the same for both the B.A. and B.S. majors – 11 core courses required. We now include a suggested program of study for each major and track so that students can more easily assess their optimal degree path at Carolina. Our suggested plans are modeled after the Department of Biology and tailored for our program. Additional course requirements are included for both majors, similar to other science degrees, to provide a foundation in the basic science core needed to succeed in subsequent upper division courses.

We outline below the general changes we make to both majors. More detailed changes are shown in the attached documents: (1) the edited and tracked version of the current Undergraduate Bulletin pages for Environment and Ecology; (2) a version of the proposed changes with tracked changes not shown; and (3) suggested environmental studies or environmental sciences programs of study for student planning to transfer from a NC community college into UNC-CH. The NC community college plans of study primarily address basic science and general education core requirements at Carolina, but both are tailored to suit our majors.

For the Environmental Studies major, B.A., we have removed the core course, ENEC 307. In addition, in the current course plan, we ask students to choose one course from a list of three GEOG courses in GIS skills. We have now provided more skills courses options and reorganized these courses into identifiable and discrete options as GIS, Remote Sensing, and Statistics. Students are asked to take one more skill course than in the previous degree plan but with no net change in the number of core requirements because we eliminate the core course ENEC 307. This proposed change also reduces the burden on the original list of courses by spreading students across more options while simultaneously asking students to choose a more focused skill. We also propose to eliminate the Energy and Sustainability concentration from our Environmental Studies major and replace this concentration with one in *Agriculture and Health*. The new concentration aligns with the new food theme on campus.

We propose to add a new Sustainability track in the Environmental Studies major, B.A. This new track redesigns the BA with a separate set of core courses and centers the degree on the pillars of sustainability (equity, economics, and environmental processes). The core courses for this new track are ENEC 201, 307, 330, and 698. Students are asked to take four courses from the pillars of sustainability (equity, environment, and economics) and three courses from a set of skills courses outlined in the attached pages. The total number of core requirement courses is the same as for the other Environmental Studies, B.A. major track – 11 courses required in each.

We propose to make changes to the Environmental Sciences, B.S. major, by reducing the number of earth system science courses by one and adding two analytical skills courses, all selected from a set of designated options (see attachments). We have eliminated the concentration in Energy and Sustainability in this major and now propose to add a new track in Quantitative Energy Systems. This new track is designed a different set of energy-related concentrations and has been coordinated with the Dept of Physics and Astronomy to facilitate the growing desire of Carolina students to gain more technical and quantitative courses in energy. In the new track, students would have the same three major core, plus four quantitative skills courses, and four concentration courses. The new concentrations are energy management, smart cities, and environmental processes. The total number of core requirement courses in both the revised B.S. and the new energy tracks is the same as for the Environmental Studies, B.A. major – 11 courses required in all.

We are happy to discuss these proposed changes to our majors at your convenience as needed. Please contact me at jecable@email.unc.edu if you have any questions.

Sincerely,

pycable

Jaye E. Cable Chair, Environment and Ecology Professor, Marine Sciences

# **Curriculum for the Environment and Ecology**

## **Environmental Studies Major, B.A., Sustainability Track**

This major is designed for students who wish to pursue business and policy with an interdisciplinary approach to resiliency and sustainability. This track is appropriate for students wishing to pursue graduate or professional studies in business or policy.

### **Core Requirements**

- ENEC 201, 307, <del>307,</del> 330, 698
- One course from each of the *Pillars of Sustainability*, plus one additional course at ≥300 level in any pillar:
  - *Equity* (ANTH 306, 439, 539; ENEC 325, 350, 351; -GEOG 470, 480; PHIL/ENEC 368; PLAN 247, 574, 637, 638; SOCI 274)
  - o *Economics* (BUSI 507, ECON 400; ENEC 306, 309, 380, 485, 580; PLCY 475)
  - *Environment* (ENEC 202, 202, 304, 324, 324L, 370, 405, 420, 431, 462, 471, 482, 489; ENEC/BIOL 256; GEOPG 441, 450; GEOG/ENEC 264; GEOL 215; MASC/ENEC 220, 441, 444, 448; MASC 433; PHYS 131; PLAN 547; PLCY/ENEC 585, 686)
- Two courses from one *skill* area and one additional course from a second *skill*:
  - o *Basic Sciences* (CHEM 101+101L and CHEM 102 + 102L; PHYS 114/115; or BIOL 101+101L and 201)
  - <u>Communications and Research (COMM/ENEC 375, ENEC 393 or 493 or 593, 395 or 396; 491, 492, 693H or 694H; JOMC/ENEC 565; PLCY 305)</u>
  - o *GIS and Remote Sensing* (ANTH 419; ENEC 479; ENVR 468; GEOG 370, 477, 491, 592; GEOL/MASC 483)
  - o Analytics (STOR 305, 455, 456; COMP 110 or 116, 401; INLS 161, 201, 382)

### Additional Requirements:

- ECON 101 required (SS)
- MATH 152 or MATH 231 required (QR)
- ECON 101 required (SS)
- ENEC 325 or COMM/ENEC 375 or MATH 152 or 231 required (QR)
- Enough free electives to accumulate at least 120 credit hours. Recommended courses are ENEC 202 (PX), ECON 400 (QI) and one of the following PH courses: ENEC 325, COMM/ENEC 375, or PHIL/ENEC 368.

Suggested Program of Study for B.A. Majors, Sustainability Track

<u>First Year</u>

• ENEC 201 (SS, GI); ENEC 202; MATH 152 or MATH 231; ECON 101; language levels 2 and 3 (FL); ENGL 105 (CR); lifetime fitness; Approaches and Connections (1-2 courses)

## Sophomore Year

• ENEC 330; two environmental skills core courses; two pillars of sustainability core courses; Approaches and Connections (three courses); one elective course

## <u>Junior Year</u>

• ENEC 307; one environmental skills core course; two pillars of sustainability core courses; ECON 400; Approaches and Connections (one course); free elective course

## <u>Senior Year</u>

• ENEC 698; remaining environmental core courses; remaining Approaches and Connections courses; free electives as needed to complete minimum of 120 academic hours

## **Environmental Science, B.S., Quantitative Energy Systems Track**

This major is designed for students with a strong interest in water, energy, and sustainable natural resources, and interdisciplinary approaches to analytics, -and-informatics, orand business. The degree provides interdisciplinary preparation for graduate or professional training as well as for jobs in government, consulting, and industry.

### **Core Requirements**

- ENEC 201, 203, and 698
- Two courses each from two of the following quantitative skills:
  - o Informatics (INLS 151, 161; STOR 215, 305)
  - o Applied Mathematics (MATH 381, 383, 528, 535, 547, 564; PHYS 331)
  - o Statistics (BIOS 511; ENEC 562, 563; GEOL 520, 525; STOR 455, 435, 456)
  - <u>Basic Science</u> (BIOL 201, 271; CHEM 261; PHYS 114/-and-115 or PHYS 1178-and /1189)
  - o *Modeling* (COMP 401and 410 or 411; ENEC/MASC/GEOL 415)
  - o GIS and Remote Sensing (ANTH 419; GEOG 370, 391, 491, 591, 592, 477, 577; GEOL/MASC 483)
- Four courses from one of the following *concentrations*:
  - *Energy Management* (ENEC 307, 395 or 396, 482, 693H or 694H; ENVR/ENEC 403; ENVR 296; ENEC/PLAN 547; GEOL 215; PHYS 131, 581, 582)
  - <u>Environmental Processes (ENEC 202, 222, 256, 395 or 396, 489; 693H or 694H;</u> <u>ENVR/ENEC 403; MASC 432, 433, 450, 460; GEOL 508, 509, 510, 520, 525;</u> <u>GEOG 410, 412, 414, 416, 441)</u>

 <u>Smart Cities (ENEC 350, 351, 325, 380, 395 or 396, 480, 485, 492, 693H or 694H;</u> <u>ENEC/PLAN 420; PLAN/ENEC 547, 641; PLAN 636, 637, 638, 651)</u>

#### **Additional Requirements:**

- BIOL 101/101L (CI, PX)
- <u>\_\_\_\_STOR 155 (QR) or BIOS 600</u>
- COMP 110 or 116 (QR) or PHYS 331
- CHEM 101+101L or PHYS 114 or PHYS 118 (PX<del>, PL</del>)
- CHEM 102+102L or PHYS 115 or PHYS 119 (PX, PL)
- MATH 231 (QR), 232 (QI), 233 (QI)
- ENEC 325 or COMM/ENEC 375 or PHIL/ENEC 368 recommended (PH)
- Enough free electives to satisfy 120-credit hours. Recommended courses are ENEC 202 (PX), ECON 101 (SS), STOR 155 (QR) or BIOS 600, and one of the following PH courses: ENEC 325, COMM/ENEC 375, or PHIL/ENEC 368.

#### Suggested Program of Study for B.S. Majors, Quantitative Energy Systems Track

#### <u>First Year</u>

 ENEC 201 (SS, GI); BIOL 101/101L; CHEM 101/101L-, 102/102Lor PHYS 114 or 118; <u>CHEM 102/102L or PHYS 115 or 119; MATH 231, 232; language levels 2 and 3; lifetime</u> <u>fitness; ENGL 105; Approaches (2 courses)</u>

#### Sophomore Year

 ENEC 203; COMP 110 or 116; MATH 233; PHYS 114/115 or PHYS 118/119; language levels 2 and 3; STOR 155 or BIOS 600; ECON 101; two courses from quantitative skills; Approaches and Connections (23 courses); free elective course

#### <u>Junior Year</u>

• COMP 110 or 116; Two courses from environmental concentration courses; fourthree courses from analytical quantitative skills; Approaches and Connections (2 courses); free elective courses

#### Senior Year

• ENEC 698; remaining environmental concentration courses; remaining Approaches and Connections courses; free electives to achieve at least 120 academic credit hours

#### NC Community College Courses with a match at UNC-Chapel Hill

Students matriculating from a North Carolina Community College should prepare for a major in Environmental Studies (B.A.) or Environmental Sciences (B.S.) at UNC-Chapel Hill through the following recommended degree paths. The degree paths are designed to address as many general education requirements as possible in the Foundations, Approaches, and Connections, while preparing the student for a rigorous program in the environment.

For B.A. majors in Environmental Studies, including the Sustainability Track, the following twoyear degree plan is recommended for students planning to transfer to UNC-CH.

#### First Year

NC CC Course	UNC-CH equivalent	Credit towards	
BIO 111	BIOL 101/101L	PX, CI	
CHM 151	CHEM 101/101L	DI DV	
CHM 152	CHEM 102/102L	ГL, ГЛ	
ENG 111/112 or 111/113	ENGL 105	CR	
ECO 251/252	ECON 101 + Genr 140	SS	
Foreign Language (2)	Language level 1 and 2	FL	
MAT 151/151A or 152 or	STOP 155	OP	
MAT 161/161A or 252/252A	STOR 155	QK	

#### Sophomore Year

NC CC Course	UNC-CH equivalent	Credit towards
MAT 263/263A	MATH 152 (sustainability track only)	QR
or MAT 271	MATH 231 (either BA track)	QI
PHY 151/152	PHYS 114/115	PX, QI
HIS 121/122	HIST 151/152	HS/WB, HS/NA
ART 114	ARTH 151	VP/WB
DRA 112	DRAM 115	LA/NA
Foreign Language (1)	Language level 3	FL

For the B.S. major, including the Quantitative Energy Systems Track, the following two-year degree plan is recommended for students planning to transfer to UNC-CH.

#### First Year

NC CC Course	UNC-CH equivalent	<b>Credit towards</b>	
BIO 111	BIOL 101/101L	PX, CI	
CHM 151	CHEM 101/101L	DI DV	
CHM 152	CHEM 102/102L	ΓL, ΓΛ	
ENG 111/112 or 111/113	ENGL 105	CR	
ECO 251/252	ECON 101 + Genr 140	SS	
Foreign Language (2)	Language level 1 and 2	FL	
MAT 151/151A or 152 or	STOD 155	OD	
MAT 161/161A or 252/252A	STUK 133	QK	

#### Sophomore Year

NC CC Course	UNC-CH equivalent	Credit towards
MAT 271	MATH 231	QI
MAT 272	MATH 232	QI
PHY 151/152 or	PHYS 114/115 or	PX, QI
PHY 251/252	PHYS 118/119	PX, QI
CHM 251	CHEM 261/262L	
HIS 121/122	HIST 151/152	HS/WB, HS/NA
ART 114	ARTH 151	VP/WB
DRA 112	DRAM 115	LA/NA
Foreign Language (1)	Language level 3	FL

Students need to follow the *Junior Year* and *Senior Year* degree plans as outlined in the current year UNC Undergraduate Bulletin for Environment and Ecology. Be advised that the primary differences in the first two years will be in the core courses in each degree option, which do not have community college equivalents as outlined in the NC Community College Common Curriculum. These *First Year* and *Second Year* core courses include:

Environmental Studies, B.A.: ENEC 201, 202

Environmental Studies, B.A., Sustainability Track: ENEC 201, 330

Environmental Sciences, B.S.: ENEC 201, 203

Environmental Sciences, B.S., Quantitative Energy Systems Track: ENEC 201, 203