



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

CURRICULUM IN ENVIRONMENT AND ECOLOGY

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27 January 2016

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 in 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,

A handwritten signature in black ink, reading "Jaye Cable", is centered at the top of the page. The signature is written in a cursive, flowing style.

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

Curriculum for the Environment and Ecology

Environmental Studies Major, B.A.

~~The environmental studies major is appropriate~~ **This major is designed** for students seeking ~~rigorous interdisciplinary~~ preparation in the social sciences and humanities needed to understand how society affects the environment, how it organizes itself to respond to environmental problems, and how understanding of the environment is transmitted through culture. ~~All students gain a sufficient base of scientific and mathematical expertise to allow them to work effectively with environmental scientists and engineers.~~ The major ~~also provides strong preparation~~ **prepares students** for graduate and professional training, especially in environmental policy, journalism, education, and law.

Core Requirements

- ~~ENEC 201, and 202, and 698~~
 - ~~ENEC 307 and 698~~
 - One of the following *earth system science* courses: BIOL 201; ENEC 222 ~~or~~ ENEC 489 or MASC/ENEC 448; ENEC/GEOL 324 and 324L; GEOG 412; ENEC/ENVR 403; ENEC/GEOL 213/110, 215, ~~ENEC/GEOL 324 and 324L; ENEC/MASC 448; GEOG 412; GEOL 110~~
 - ~~One~~ Two courses from one of the following ~~courses~~ *skills* categories:
 - GIS (ANTH 419, ENEC 479, GEOG 370, ~~477, or 370,~~ 491, 541, 591, 592)
 - Remote Sensing (GEOG 370, 477, 577; GEOL/MASC 483)
 - Statistics (~~STOR 155, BIOS 600, ENEC 562, ECON 400, ENEC 562~~ STOR 155)
 - Five courses chosen from one of the following *concentrations*:
 - Agriculture and Health (ANTH 237*, 252, 306, 319; ANTH/ENEC 238; ENEC/GEOL 324, 324L; ENEC 325, 370, 395 or 396, 420, 693H or 694H; ENEC/ENVR 522; GEOG 434, 457, 542; PLCY 475, 485)
*pending approval of ANTH 237 as a new course
 - Ecology and Society (ANTH 226, 318, 320, 439; ANTH/ENEC 238, 460; BIOL 201, 272, 277, 402, 427, 461, 463, 464, 465, 469, 561, 565, 567; BIOL/ENEC 256, 461, 562; CHIN 356; ENEC 222, 304, ~~352, three hours of 395 or, three hours of 396,~~ 462, 479, 489, 491, 693H or 694H; ENEC/GEOG 264; ENEC/GEOL 324; ENEC/GEOL/MASC 450; ENEC/MASC 352*, 441, 444, 448, 471; ENEC/PLCY 372, 520; ENEC/POLI 254; GEOG 228, 232, 261, 423, 434, 444, 470, 597; PLAN 641)
*pending approval of ENEC 352 crosslist with MASC
- Energy and Sustainability

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~~— Agriculture and Health (ANTH 237*, 252, 306, 319; ANTH/ENEC 238; ENEC/GEOL 324, 324L; ENEC 325, 370, 395 or 396, 420, 693H or 694H; ENEC/ENVR 522; GEOG 434, 457, 542; PLCY 475, 485~~

~~*pending approval of ANTH 237 as a new course~~

~~BUSI 507; ENEC 208, 306, 325, 350, 370, 393, 395, 396, 482, 485, 491, 492, 581, 586, 685, 693H or 694H; ENEC/ENVR/PLAN/PLCY 585, 686; ENEC/GEOL 324; ENEC/JOMC 565; ENEC/PLAN 330, 420; ENEC/PLCY 480; GEOG 237, 414, 441; PHYS 131; PLAN 246, 247, 547, 641~~

- ~~Environmental Behavior and Decision Making (ANTH 422, 539; BIOL/MATH 452; BUSI 507; COMM/ENEC 375; ENEC 305, 306, 309, 312, 325, 350, 351, 380, 395 or 396, 462, 474, 485, 580, 581, 586, 491, 492, 675, 685, 693H or 694H; ENEC/ENVR 470; ENEC/ENVR/PLAN/PLCY 585; ENEC/GEOL 324; ENEC/JOMC 565; ENEC/PLCY 372, 480; ENEC/POLI 254; GEOG 237, 435, 470; PLAN 547, 641; PLCY 475)~~
- ~~Population, Environment, and Development (ANTH 318, 319, 439, 459, 539; ANTH/ENEC 238; ENEC 266, 325, 350, 351, 370, 380, 395, or 396, 485, 491, 492, 580, 693H or 694H; ENEC/GEOL 324; ENEC/PLCY 520; ENVR 600; GEOG 237, 269, 445, 450, 452, 457, 470; PLCY 475)~~

~~**Additional Requirements:** (All General Education category requirements must be noted where satisfied, some with specific courses):~~

- ~~BIOL 101 +/101L required (Approaches physical and life sciences with laboratory requirement)(CI, PX)~~
- ~~CHEM 101 +/101L or PHYS 104 or 114 or 118 required (Approaches physical and life sciences requirement)(PX)~~
- ~~CHEM 102 +/102L or PHYS 105 or 115 or 119 required (PX)~~
- ~~ECON 101 required (SS Approaches social and behavioral sciences requirement)~~
- ~~MATH 231 required (QR)~~
- ~~ECON 400 or STOR 155 (Connections quantitative intensive requirement)~~
- ~~ENEC 325 or COMM/ENEC 375 or ENEC/PHIL 368 recommended (Approaches philosophical and moral reasoning requirement)~~
- ~~MATH 231 (Foundations quantitative reasoning requirement)(QR)~~
- ~~Enough free electives to accumulate at least 120 credit hours. Recommended courses are 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

First Year

- ENEC 201 (SS, GI); BIOL 101/101L; MATH 231; ECON 101; language levels 2 and 3 (FL); ENGL 105 (CR); lifetime fitness; Approaches and Connections (2 courses)

Sophomore Year

- ENEC 202; CHEM 101/101L or PHYS 114 or 118; CHEM 102/102L or PHYS 115 or 119; one earth system science core; two courses from the concentration core; Approaches and Connections (two courses)

Junior Year

- Two courses from the environmental skills core; two courses from the concentration core; ECON 400; Approaches and Connections (3 courses); free elective course;

Senior Year

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

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~~, 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)
 - *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*:
 - *Basic Sciences* (CHEM 101+101L and CHEM 102 + 102L; PHYS 114/115; or BIOL 101+101L and 201)
 - *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)
 - *GIS and Remote Sensing* (ANTH 419; ENEC 479; ENVR 468; GEOG 370, 477, 491, 592; GEOL/MASC 483)
 - *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

First Year

- 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

Junior Year

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

Senior Year

- 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.

~~The environmental science~~This major is ~~appropriate-designed~~ for students ~~interested in solving~~ complex environmental and energy resource related problems. ~~The major includes preparation in the basic sciences related to environmental study and the application of those principles to the analysis of environmental processes and problems. It focus~~inges on such topics as how material and energy are moved and transformed in complex environmental systems, the role of society in perturbing those processes, and scientific techniques which might be used to improve environmental quality. The degree provides ~~strong-interdisciplinary~~ preparation for graduate or professional training as well as for jobs in government, consulting, and industry.

Core Requirements

• ~~ENEC 201, and 203, and 698~~

~~• ENEC 698~~

• ~~OneTwo~~ of the following *earth system science* courses: BIOL 201; ENEC 202; ENEC 222 or ENEC 489 or ~~ENEC/MASC/ENEC 448; ENEC/GEOL 324 + 324L; ENEC/ENVR/ENEC 403; ENEC/GEOL 324 + 324L; ENEC/GEOL 213-215 or GEOL 110~~

• Two courses from one analytical skills option:

○ Applied Math (MATH 233, 383)

○ GIS and Remote Sensing (ANTH 419; ENEC 479; GEOG 370, 391, 477, 577, 591; GEOL/MASC 483)

○ Statistics (ENEC/BIOL 562, STOR 455, 456; BIOS 511, 550; GEOL 520, 525)

○ Basic Science (BIOL 202, CHEM 261)

• Five courses chosen from one of the following concentrations:

~~*Water and Climate* (BIOL 350/ENVR 417/GEOL 403/MASC 401; ENEC 222; ENEC/ENVR/ENEC 403; ENEC/GEOG/ENEC 253; ENEC/GEOL/ENEC 211, 213, 324, 417; ENEC/GEOL/MASC 411, 415, 450; ENVR 413, 415, 416, 419, 453; GEOG 370, 412, 414, 416; GEOG 440/GEOL 502; GEOL 202, 417L, 432, 508, 509, 510; GEOL/MASC 430, 483, 503, 506; MASC 312, 314, 390, 432, 460, 490)~~

Ecology and Natural Resources (BIOL 201, 272, 277/277L, 402, 463, 464, 465, 469, 471/471L, 476/476L, 561, 565, 568; BIOL/ENEC 256, 461, ~~562~~, 563; BIOL 462/MASC 440; BIOL 657/ENVR 520/MASC 504; ENEC 222, 304, ~~352~~, 370, 462, 479, 485, 489; ENEC/BIOL 562; ENEC/GEOG 264; ENEC/GEOL 324 +324L; ENEC/GEOL/MASC 450; ENEC/MASC 352*; ~~ENEC/MASC/ENEC 433, 441, 444, 448, 471; ENVR 449; GEOG 444; MASC 443, 445)~~

*The ENEC 352 crosslist with MASC is pending approval.

Energy and Sustainability

~~ENEC 306, 307, 325, 350, 380, 431, 479, 482, 485, 580, 581, 586, 685; ENEC/ENVR 403; ENEC/ENVR/PLAN/PLCY 585, 686; ENEC/GEOL 324; ENEC/GEOL/MASC 415; ENEC/PLCY 480; ENVR 451; GEOL 215; PHYS 131/131L; PLAN 547~~

Environment and Health (BIOL 402, 568; BIOL/PATH 128; CHEM 261; ENEC 222; ENEC/ENVR 403, 522; ENEC/GEOL 324; ENEC/MASC 444; ENVR 412, 413, 416, 419, 421, 430, 431, 442, 451, 600; EPID 600; MASC 443)

~~*Water and Climate* (BIOL 350/ENVR 417/GEOL 403/MASC 401; ENEC 222; ENVR/ENEC 403; GEOG/ENEC 253; GEOL/ENEC 211, 213, 324, 417; ENEC/GEOL/MASC 411, 415, 450; ENVR 413, 415, 416, 419, 453; GEOG 370, 412, 414, 416; GEOG 440/GEOL 502; GEOL 202, 417L, 432, 508, 509, 510; GEOL/MASC 430, 483, 503, 506; MASC 312, 314, ~~390, 432, 433, 460, 490~~)~~

Additional Requirements:

- ~~BIOS 600 or STOR 155~~
- ~~BIOL 101+101L required (CI, PX) required~~
- ~~CHEM 101+101L and CHEM 102 and 102L required (PX) required~~
- ~~COMP 116 or 110 required (QR) required~~
- ~~MATH 233~~
- ~~PHYS 116 and 117, or PHYS 118/ and 119; or PHYS 104 and 105, or PHYS 114/ and 115 required (PX) required~~
- ~~BIOS 511 or STOR 455 or ENEC 562 (required)~~
- ~~MATH 231 required (QR)~~
- ~~MATH 232 required (QI)~~
- ~~recommended recommended • BIOS 511 or STOR 455 or ENEC 562 recommended~~
- ~~MATH 231 (QI) required~~
- ~~MATH 232 (QR) required~~

- ~~Two courses from one of the following options:~~
 - ~~BIOL 202 and CHEM 261~~
 - ~~ENEC 415; MASC 460; MATH 383, 564~~
 - ~~ENEC 562; STOR 455, 456~~
 - ~~GEOG 370, 477, 491, 577, 591, 592~~
- Students are required to earn a minor in an allied science, such as biology, chemistry, computer science, geography, geology, information ~~and library~~ science, marine science, mathematics, mathematical decision sciences, or physics.
- Enough free electives to accumulate minimum of 120 credit hours. Recommended courses are ENEC 202 (PX), ECON 101 (SS), one of the following PH courses: ENEC 325, COMM/ENEC 375, or PHIL/ENEC 368, and one of the following statistics courses: BIOS 511 or STOR 455 or ENEC 562.

Suggested Program of Study for B.S. Majors

First Year

- ENEC 201 (SS, GD); BIOL 101/101L; CHEM 101/101L; ~~CHEM 102/102L~~; MATH 231; MATH 232; language level 2 (FL); Approaches and Connections (two courses); lifetime fitness

Sophomore Year

- ENEC 203; CHEM 102/102L; one environmental concentration course; one earth system science core course; PHYS 114 or 118; PHYS 115 or 119; COMP 110 or 116; language levels ~~2 and 3~~ (FL); Approaches and Connections (one course)

Junior Year

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- Two courses from the analytical skills core; three courses from environmental concentration core; two courses from a minor field; Approaches and Connections (three courses)

Senior Year

- ENEC 698; remaining environmental concentration core; remaining minor field courses; remaining Approaches and Connections; enough free electives to meet 120 academic hour minimum

~~All General Education requirements must be satisfied, some with specific courses:~~

- ~~BIOL 101 and 101L (Approaches physical and life sciences with laboratory requirement)~~
- ~~CHEM 101 and 101L (Approaches physical and life sciences requirement)~~
- ~~ECON 101 recommended (Approaches social and behavioral sciences requirement)~~
- ~~ENEC/PHIL 368 recommended (Approaches philosophical and moral reasoning)~~
- ~~MATH 231 (Foundations quantitative reasoning requirement)~~
- ~~MATH 232 (Connections quantitative intensive requirement)~~

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, ~~or~~ and 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:
 - Informatics (INLS 151, 161; STOR 215, 305)
 - Applied Mathematics (MATH 381, 383, 528, 535, 547, 564; [PHYS 331](#))
 - Statistics (BIOS 511; ENEC 562, 563; GEOL 520, 525; STOR 455, 435, 456)
 - Basic Science ([BIOL 201, 271](#); [CHEM 261](#); [PHYS 114](#)/~~and~~ [115](#) or [PHYS 1178](#)~~and~~ [/1189](#))
 - Modeling (COMP 401 and 410 or 411; ENEC/MASC/GEOL 415)
 - 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)
- Environmental Processes (ENEC 202, 222, 256, 395 or 396, 489; 693H or 694H; ENVR/ENEC 403; MASC 432, 433, 450, 460; GEOL 508, 509, 510, 520, 525; GEOG 410, 412, 414, 416, 441)
- Smart Cities (ENEC 350, 351, 325, 380, 395 or 396, 480, 485, 492, 693H or 694H; ENEC/PLAN 420; PLAN/ENEC 547, 641; PLAN 636, 637, 638, 651)

Additional Requirements:

- BIOL 101/101L (CI, PX)
- STOR 155 (QR) or BIOS 600
- COMP 110 or 116 (QR) or PHYS 331
- CHEM 101+101L or PHYS 114 or PHYS 118 (PX, ~~PL~~)
- CHEM 102+102L or PHYS 115 or PHYS 119 (PX, ~~PL~~)
- MATH 231 (QR), 232 (QD), 233 (QI)
- ECON 101 (SS)
- 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

First Year

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

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

Junior Year

- COMP 110 or 116; Two courses from environmental concentration courses; ~~four~~ three 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

Dual Bachelor's–Master's Degree Program

We offer two ~~The~~ dual bachelor's–master's programs ~~through our program (1) in Environmental and Science Communication, is a collaboration between the Curriculum for the~~ Environment and Ecology and the School of Media and Journalism; ~~and (2) in Environmental Informatics, a collaboration with the School of Information and Library Sciences. The~~Both programs ~~is-are~~ designed for students to earn their bachelors ~~-of-arts~~ degree ~~with a major in environmental studies~~ and complete a master's degree ~~in journalism~~ in as little as five years. ~~For the Environmental Science Communication program, S~~students must complete the undergraduate requirements for the B.A. degree ~~in environmental studies~~ and the graduate requirements for the M.A. degree ~~in mass communication~~ as separate degrees. ~~For the Environmental Informatics program, S~~students ~~must complete the undergraduate requirements for the B.S. degree in environmental sciences and the graduate requirements for the M.S.I.S. degree in information sciences as separate degrees. Students~~ may begin taking courses for the graduate degree while in the undergraduate program, and ~~up to nine credit hours of a limited number of credit hours of~~ approved graduate coursework may be transferred into their graduate degree program ~~in mass communication (up to 9 hours) and information sciences (up to 12 hours)~~. Courses taken as an undergraduate for graduate credit may not be counted as part of the undergraduate degree if the intent is to transfer them ~~to the graduate program~~. Early advising is essential to success in navigating the ~~ese~~ dual-degree programs. Advisors are available in both units to help students prepare and select courses appropriately to get the most from their education.

Applying for the program is a two-step process. It is highly recommend that first- and second-year students interested in the dual-degree program speak to an advisor early in their college program. Students must submit a conditional application to the program no later than their junior year to ensure they will receive preference in registering for courses. Students must formally apply to the program through the UNC Graduate School in their senior year. We do not require the GRE for this application if you are an existing UNC student. For complete information on the application process and curriculum requirements, please go to esc.web.unc.edu.

Environmental Science and Studies Minor

The minor is designed for students wishing to remain in another discipline but having an interest in the environment as an area of application. Students in the minor in environmental science and studies must take two core courses designed as preliminary courses in the scientific and societal dimensions of environmental issues and problems and in the tools for their solution.

- ENEC 201 and ~~either ENEC 202 or 203~~
- Three additional ENEC courses (at least one at the 400 level or higher)

Students must see an ENEC advisor to discuss potential courses. Depending on the courses selected, the minor ~~would~~ require between 17 and 20 credit hours. Students in the BA or BS environmental majors may not minor in Environmental Science and Studies.

Sustainability Studies Minor

The program provides an understanding of sustainability, a unifying approach to human and environmental problems. Sustainable businesses, communities, and other organizations seek to design systems in ways that optimize material and energy use to decrease environmental and health problems and to bolster economic vitality and social equity. A growing number of scholars are framing problems and solutions in the language of sustainability, which balances growth and development with justice and environmental stewardship in order to meet today's needs without undermining the ability of future generations to do the same.

- ENEC ~~204~~, 210, or 593
- ENEC 330 or 431 (If both are taken, the second course may satisfy the elective requirement.)
- ENEC 393 or 493 (for at least three credits) or 698
- Three elective courses chosen from BUSI 507; COMM/ENEC 375; ENEC 201, 202, 220, 305, 306, 307, 325, 350, 351, 370, 405, 462, 474, 479, 490, 510, 567, 675; ENEC/ENVR 470, 522; ENEC/ENVR/PLAN/PLCY 686; ENEC/GEOG 264; ENEC/GEOL 213, 324; ENEC/JOMC 565; ENEC/MASC 448, 471; ENEC/PLAN 420; ENEC/PLCY 372, 480, 520; ENVR 600; GEOG 237, 370, 420, 434; GEOL/MASC 223; PHYS 131/131L; PLAN 246, 247, 547, 636, 641; PLCY 360

The minor requires a minimum of 16 credit hours. Students who major in ~~the curriculum's~~ the B.A. or B.S. environmental degree programs are not allowed to minor in sustainability studies.

Curriculum for the Environment and Ecology

Environmental Studies Major, B.A.

This major is designed for students seeking interdisciplinary preparation in the social sciences and humanities needed to understand how society affects the environment, how it organizes itself to respond to environmental problems, and how understanding of the environment is transmitted through culture. The major prepares students for graduate and professional training, especially in environmental policy, journalism, education, and law.

Core Requirements

- ENEC 201, 202, and 698
 - One of the following *earth system science* courses: BIOL 201; ENEC 222 or ENEC 489 or MASC/ENEC 448; ENEC/GEOL 324 + 324L; GEOG 412; GEOL 110, 215
 - Two courses from one of the following *skills* categories:
 - *GIS* (ANTH 419, ENEC 479, GEOG 370, 491, 541, 591, 592)
 - *Remote Sensing* (GEOG 370, 477, 577; GEOL/MASC 483)
 - *Statistics* (BIOS 600, ENEC 562, ECON 400, STOR 155)
 - Five courses chosen from one of the following *concentrations*:
 - *Agriculture and Health* (ANTH 237*, 252, 306, 319; ANTH/ENEC 238; ENEC/GEOL 324, 324L; ENEC 325, 370, 395 or 396, 420, 693H or 694H; ENEC/ENVR 522; GEOG 434, 457, 542; PLCY 475, 485
- *pending approval of ANTH 237 as a new course
- *Ecology and Society* (ANTH 226, 318, 320, 439; ANTH/ENEC 238, 460; BIOL 201, 272, 277, 402, 427, 461, 463, 464, 465, 469, 561, 565, 567; BIOL/ENEC 256, 461, 562; CHIN 356; ENEC 222, 304, 395 or 396, 462, 479, 489, 491, 693H or 694H; ENEC/GEOL 264; ENEC/GEOL 324; ENEC/GEOL/MASC 450; ENEC/MASC 352*, 441, 444, 448, 471; ENEC/PLCY 372, 520; ENEC/POLI 254; GEOG 228, 232, 261, 423, 434, 444, 470, 597; PLAN 641)
- *pending approval of ENEC 352 crosslist with MASC
- *Environmental Behavior and Decision Making* (ANTH 422, 539; BIOL/MATH 452; BUSI 507; COMM/ENEC 375; ENEC 305, 306, 309, 312, 325, 350, 351, 380, 395 or 396, 462, 474, 485, 580, 581, 586, 491, 492, 675, 685, 693H or 694H; ENEC/ENVR 470; ENEC/ENVR/PLAN/PLCY 585; ENEC/GEOL 324; ENEC/JOMC 565; ENEC/PLCY 372, 480; ENEC/POLI 254; GEOG 237, 435, 470; PLAN 547, 641; PLCY 475)

- *Population, Environment, and Development* (ANTH 318, 319, 439, 459, 539; ANTH/ENEC 238; ENEC 266, 325, 350, 351, 370, 380, 395 or 396, 485, 491, 492, 580, 693H or 694H; ENEC/GEOL 324; ENEC/PLCY 520; ENVR 600; GEOG 237, 269, 445, 450, 452, 457, 470; PLCY 475)

Additional Requirements:

- BIOL 101 +101L (CI, PX)
- CHEM 101+101L or PHYS 114 or 118 (PX)
- CHEM 102+102L or PHYS 115 or 119 (PX)
- ECON 101 (SS)
- MATH 231 (QR)
- Enough free electives to accumulate at least 120 credit hours. Recommended courses are 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

First Year

- ENEC 201 (SS, GI); BIOL 101/101L; MATH 231; ECON 101; language levels 2 and 3 (FL); ENGL 105 (CR); lifetime fitness; Approaches and Connections (2 courses)

Sophomore Year

- ENEC 202; CHEM 101/101L or PHYS 114 or 118; CHEM 102/102L or PHYS 115 or 119; one earth system science core; two courses from the concentration core; Approaches and Connections (two courses)

Junior Year

- Two courses from the environmental skills core; two courses from the concentration core; ECON 400; Approaches and Connections (3 courses); free elective course;

Senior Year

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

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, 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)
 - *Economics* (BUSI 507, ECON 400; ENEC 306, 309, 380, 485, 580; PLCY 475)
 - *Environment* (ENEC 202, 304, 324, 324L, 370, 405, 420, 431, 462, 471, 482, 489; ENEC/BIOL 256; GEOG 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*:
 - *Basic Sciences* (CHEM 101+101L and CHEM 102 + 102L; PHYS 114/115; or BIOL 101+101L and 201)
 - *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)
 - *GIS and Remote Sensing* (ANTH 419; ENEC 479; ENVR 468; GEOG 370, 477, 491, 592; GEOL/MASC 483)
 - *Analytics* (STOR 305, 455, 456; COMP 110 or 116, 401; INLS 161, 201, 382)

Additional Requirements:

- ECON 101 (SS)
- MATH 152 or MATH 231 (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

First Year

- 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

Junior Year

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

Senior Year

- 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.

This major is designed for students focusing on such topics as how material and energy are moved and transformed in complex environmental systems, the role of society in perturbing those processes, and scientific techniques which might be used to improve environmental quality. 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
- One of the following *earth system science* courses: BIOL 201; ENEC 202; ENEC 222 or ENEC 489 or MASC/ENEC 448; ENEC/GEOL 324 + 324L; ENVR/ENEC 403; GEOL 215
- Two courses from one *analytical skills* option:
 - *Applied Math* (MATH 233, 383)
 - *GIS and Remote Sensing* (ANTH 419; ENEC 479; GEOG 370, 391, 477, 577, 591; GEOL/MASC 483)
 - *Statistics* (ENEC/BIOL 562, STOR 455, 456; BIOS 511, 550; GEOL 520, 525)
 - *Basic Science* (BIOL 202, CHEM 261)
- Five courses chosen from one of the following concentrations:

Ecology and Natural Resources (BIOL 201, 272, 277/277L, 402, 463, 464, 465, 469, 471/471L, 476/476L, 561, 565, 568; BIOL/ENEC 256, 461, 563; BIOL 462/MASC 440; BIOL 657/ENVR 520/MASC 504; ENEC 222, 304, 370, 462, 479, 485, 489; ENEC/BIOL 562; ENEC/GEOG 264; ENEC/GEOL 324 +324L; ENEC/GEOL/MASC 450; ENEC/MASC 352*; MASC/ENEC 433, 441, 444, 448, 471; ENVR 449; GEOG 444; MASC 443, 445)

*The ENEC 352 crosslist with MASC is pending approval.

Environment and Health (BIOL 402, 568; BIOL/PATH 128; CHEM 261; ENEC 222; ENEC/ENVR 403, 522; ENEC/GEOL 324; ENEC/MASC 444; ENVR 412, 413, 416, 419, 421, 430, 431, 442, 451, 600; EPID 600; MASC 443)

Water and Climate (BIOL 350/ENVR 417/GEOL 403/MASC 401; ENEC 222; ENVR/ENEC 403; GEOG/ENEC 253; GEOL/ENEC 211, 213, 324, 417; ENEC/GEOL/MASC 411, 415, 450; ENVR 413, 415, 416, 419, 453; GEOG 370, 412, 414, 416; GEOG 440/GEOL 502; GEOL 202, 417, 432, 508, 509, 510; GEOL/MASC 430, 483, 503, 506; MASC 312, 314, 432, 433, 460)

Additional Requirements:

- BIOL 101+101L required (CI, PX)
- CHEM 101+101L and CHEM 102+102L (PX)
- COMP 116 or 110 (QR)
- PHYS 118/119 or PHYS 114/115 (PX)
- MATH 231 (QR)
- MATH 232 (QI)
- Students are required to earn a minor in an allied science, such as biology, chemistry, computer science, geography, geology, information science, marine science, mathematics, mathematical decision sciences, or physics.
- Enough free electives to accumulate minimum of 120 credit hours. Recommended courses are ENEC 202 (PX), ECON 101 (SS), one of the following PH courses: ENEC 325, COMM/ENEC 375, or PHIL/ENEC 368, and one of the following statistics courses: BIOS 511 or STOR 455 or ENEC 562.

Suggested Program of Study for B.S. Majors

First Year

- ENEC 201 (SS, GI); BIOL 101/101L; CHEM 101/101L; MATH 231; MATH 232; language level 2 (FL); Approaches and Connections (two courses); lifetime fitness

Sophomore Year

- ENEC 203; CHEM 102/102L; one environmental concentration course; one earth system science core course; PHYS 114 or 118; PHYS 115 or 119; COMP 110 or 116; language levels 3 (FL); Approaches and Connections (one course)

Junior Year

- Two courses from the analytical skills core; three courses from environmental concentration core; two courses from a minor field; Approaches and Connections (three courses)

Senior Year

- ENEC 698; remaining environmental concentration core; remaining minor field courses; remaining Approaches and Connections; enough free electives to meet 120 academic hour minimum

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, informatics, or 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:
 - *Informatics* (INLS 151, 161; STOR 215, 305)
 - *Applied Mathematics* (MATH 381, 383, 528, 535, 547, 564; PHYS 331)
 - *Statistics* (BIOS 511; ENEC 562, 563; GEOL 520, 525; STOR 455, 435, 456)
 - *Basic Science* (BIOL 201, 271; CHEM 261; PHYS 114/115 or PHYS 118/119)
 - *Modeling* (COMP 401 and 410 or 411; ENEC/MASC/GEOL 415)
 - *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; ENEC/PLAN 547; GEOL 215; PHYS 131, 581, 582)
 - *Environmental Processes* (ENEC 202, 222, 256, 395 or 396, 489; 693H or 694H; ENVR/ENEC 403; MASC 432, 433, 450, 460; GEOL 508, 509, 510, 520, 525; GEOG 410, 412, 414, 416, 441)
 - *Smart Cities* (ENEC 350, 351, 325, 380, 395 or 396, 480, 485, 492, 693H or 694H; ENEC/PLAN 420; PLAN/ENEC 547, 641; PLAN 636, 637, 638, 651)

Additional Requirements:

- BIOL 101/101L (CI, PX)
- COMP 110 or 116 (QR) or PHYS 331
- CHEM 101+101L or PHYS 114 or PHYS 118 (PX)
- CHEM 102+102L or PHYS 115 or PHYS 119 (PX)
- MATH 231 (QR), 232 (QI), 233 (QI)
- 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

First Year

- ENEC 201 (SS, GD); BIOL 101/101L; CHEM 101/101L, 102/102L; MATH 231, 232; language levels 2 and 3; lifetime fitness; ENGL 105; Approaches (2 courses)

Sophomore Year

- ENEC 203; MATH 233; PHYS 114/115 or PHYS 118/119; two courses from quantitative skills; Approaches and Connections (3 courses); free elective course

Junior Year

- COMP 110 or 116; Two courses from environmental concentration courses; three courses from 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

Dual Bachelor's–Master's Degree Program

We offer two dual bachelor's–master's programs through our program (1) in Environment and Science Communication, a collaboration between the Curriculum in Environment and Ecology and the School of Media and Journalism; and (2) in Environmental Informatics, a collaboration with the School of Information and Library Sciences. Both programs are designed for students to earn their bachelors degree and complete a master's degree in as little as five years. For the Environmental Science Communication program, students must complete the undergraduate requirements for the B.A. degree in environmental studies and the graduate requirements for the M.A. degree in mass communication as separate degrees. For the Environmental Informatics program, students must complete the undergraduate requirements for the B.S. degree in environmental sciences and the graduate requirements for the M.S.I.S. degree in information sciences as separate degrees. Students may begin taking courses for the graduate degree while in the undergraduate program, and a limited number of credit hours of approved graduate coursework may be transferred into their graduate degree program in mass communication (up to 9 hours) and information sciences (up to 12 hours). Courses taken as an undergraduate for graduate credit may not be counted as part of the undergraduate degree if the intent is to transfer them to the graduate program. Early advising is essential to success in navigating these dual-degree programs. Advisors are available in both units to help students prepare and select courses appropriately to get the most from their education.

Applying for the program is a two-step process. It is highly recommend that first- and second-year students interested in the dual-degree program speak to an advisor early in their college program. Students must submit a conditional application to the program no later than their junior year to ensure they will receive preference in registering for courses. Students must formally apply to the program through the UNC Graduate School in their senior year. We do not require the GRE for this application if you are an existing UNC student. For complete information on the application process and curriculum requirements, please go to esc.web.unc.edu.

Environmental Science and Studies Minor

The minor is designed for students wishing to remain in another discipline but having an interest in the environment as an area of application. Students in the minor in environmental science and

studies must take two core courses designed as preliminary courses in the scientific and societal dimensions of environmental issues and problems and in the tools for their solution.

- ENEC 201 and 202
- Three additional ENEC courses (at least one at the 400 level or higher)

Students must see an ENEC advisor to discuss potential courses. Depending on the courses selected, the minor requires between 17 and 20 credit hours. Students in the BA or BS environmental majors may not minor in Environmental Science and Studies.

Sustainability Studies Minor

The program provides an understanding of sustainability, a unifying approach to human and environmental problems. Sustainable businesses, communities, and other organizations seek to design systems in ways that optimize material and energy use to decrease environmental and health problems and to bolster economic vitality and social equity. A growing number of scholars are framing problems and solutions in the language of sustainability, which balances growth and development with justice and environmental stewardship in order to meet today's needs without undermining the ability of future generations to do the same.

- ENEC 210 or 593
- ENEC 330 or 431 (If both are taken, the second course may satisfy the elective requirement.)
- ENEC 393 or 493 (for at least three credits) or 698
- Three elective courses chosen from BUSI 507; COMM/ENEC 375; ENEC 201, 202, 220, 305, 306, 307, 325, 350, 351, 370, 405, 462, 474, 479, 490, 510, 567, 675; ENEC/ENVR 470, 522; ENEC/ENVR/PLAN/PLCY 686; ENEC/GEOG 264; ENEC/GEOL 213, 324; ENEC/JOMC 565; ENEC/MASC 448, 471; ENEC/PLAN 420; ENEC/PLCY 372, 480, 520; ENVR 600; GEOG 237, 370, 420, 434; GEOL/MASC 223; PHYS 131/131L; PLAN 246, 247, 547, 636, 641; PLCY 360

The minor requires a minimum of 16 credit hours. Students who major in the B.A. or B.S. environmental degree programs are not allowed to minor in sustainability studies.

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 two-year 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	PL, PX
CHM 152	CHEM 102/102L	
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 MAT 161/161A or 252/252A	STOR 155	QR

Sophomore Year

NC CC Course	UNC-CH equivalent	Credit towards
MAT 263/263A or MAT 271	MATH 152 (sustainability track only) MATH 231 (either BA track)	QR 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	Credit towards
BIO 111	BIOL 101/101L	PX, CI
CHM 151	CHEM 101/101L	PL, PX
CHM 152	CHEM 102/102L	
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 MAT 161/161A or 252/252A	STOR 155	QR

Sophomore Year

NC CC Course	UNC-CH equivalent	Credit towards
MAT 271	MATH 231	QI
MAT 272	MATH 232	QI
PHY 151/152 or PHY 251/252	PHYS 114/115 or PHYS 118/119	PX, QI 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