

# Environmental Sciences Undergraduate Program

## OSU Ecampus - Online Degree

### Guidelines for the “Basic Science and Math” Requirements

The following guidelines have been developed to aid those Prospective Students who want to complete the science requirement(s) prior to their admittance to Oregon State University (OSU) and the Environmental Sciences (ENSC) undergraduate program. This is highly recommended, as some students experience greater success taking these challenging courses in-person. However, this coursework does not have to be completed prior to starting the program – it can also be done while a student is enrolled in the ENSC program. If a student is uncertain on the best course of action, they are encouraged to consult with an [Ecampus success counselor](#). In no way are these guidelines [official approval](#) to meet specific degree requirements.

#### [Basic Science and Math requirements](#)

1. [Math](#)
2. [Chemistry](#)
3. [Biology](#)
4. [Physics](#)
5. [Statistics](#)

#### [Evaluation and Transferability of Credit](#)

#### [Transfer Resources](#)

#### [Transfer Credit and the ENSC Degree Requirements](#)

#### [Why the Basic Science and Math sequences are important](#)

### Basic Science and Math requirements

The following are listed in the order we recommend they are completed.

#### 1. **Math (calculus)**

- A calculus sequence covering both differential and integral calculus for engineers and scientists. Calculus for social science or business applications is not appropriate.
- Two semesters (one semester does not cover enough integral calculus), or two quarters equivalent to MTH 251/252 at OSU
- Available online thru OSU Ecampus
- Students should complete a pre-calculus course (college algebra and trigonometry) before attempting calculus.
- **MTH 251 (Differential) Course Content:** Rates of change: the derivative, velocity, and acceleration. Algebraic rules of differential calculus and derivatives of polynomial, rational, and trigonometric functions. Maximum-minimum problems, curve sketching, and other applications. Anti-derivatives and simple motion problems
- **MTH 252 (Integral) Course Content:** Definite integrals, elementary applications to area, force, and work. Integral tables and basic techniques of integration, calculus of logarithmic and exponential functions, polar coordinates, applications to areas, volumes, force, work, and growth and decay problems



## 2. Chemistry

- A general chemistry sequence for students who have had no previous training in chemistry and for those whose college aptitude test scores indicate the need for a more elementary introduction to chemistry. OR, a general chemistry sequence for students majoring in most sciences, pharmacy, and chemical engineering. Must include a full year of labs.
- Two semesters or three quarters equivalent to CH 121/122/123 or CH 221/222/223 at OSU.
- 100-level chemistry sequence is available online thru OSU Ecampus. 200-level sequence is available online as a hybrid sequence (lecture online/labs in person).
- **CH 121 Course Content:** Matter and measurement; atoms and elements; molecules, ions, and their compounds; chemical equations and stoichiometry; reactions in aqueous solutions; gases and their properties; principles of reactivity: energy and chemical reactions; atomic structure; atomic electron configurations.
- **CH 122 Course Content:** Atomic electron configurations; bonding and molecular structure: fundamental concepts; bonding and molecular structure: hybridization and molecular Orbitals; intermolecular forces; solutions and their behavior; chemical kinetics; carbon chemistry.
- **CH 123 Course Content:** Chemistry of acids; aqueous equilibrium; entropy and free energy; electrochemistry; nuclear chemistry; main group elements; transition elements; chemical equilibrium.



## 3. Biology

- A biology sequence intended for science/biology majors, with labs, at an accredited institution.
- Two semesters or three quarters equivalent to BI 204/205/206 (not intended for pre-health profession students) or BI 211/212/213 at OSU.
- Online biology sequence BI 204/205/206 is available thru OSU Ecampus. Online sequences from other institutions are not acceptable, unless taught in a hybrid format (lecture online/lab in person).
- If it is not clear, based on the college course description, that the biology sequence is intended for science majors, you should follow these steps: 1) Consult with the college's science department or biology instructor. 2) Does the college have transfer agreements with an accredited University? If so, what biology courses at the college level are accepted for transfer, and will meet the basic freshman biology sequence for the BS of Biology degree at that particular university; and, 3) Contact an [Ecampus success counselor](#) for further clarification.
- **BI 204 Course Content:** Foundations of biological sciences including scientific inquiry, genetics, evolution, and ecology. Significant emphasis throughout on the application of core concepts to solve human and environmental problems.
- **BI 205 Course Content:** Fundamental concepts in molecular and cellular biology, beginning with biomolecules and the origin of life, and ending with genomics. Significant emphasis throughout on applications of biotechnology to solve human problems.
- **BI 206 Course Content:** Basic plant and animal physiology from an evolutionary perspective. Significant emphasis on topics of importance to human society, including human and plant disease.
- Labs emphasize skills in critical thinking, scientific writing, and experimental design.



#### 4. Physics:

- An introductory algebra-based or calculus-based physics sequence, with labs.
- One semester or two quarters equivalent to PH 201/202 at OSU.
- Available online thru OSU's [Degree Partner](#), Chemeketa Community College.
- **PH 201 Course Content:** Kinematics, Newton's laws, energy, momentum, and rotation.
- **PH 202 Course Content:** Fluids, oscillations, waves, thermodynamics, and electricity.
- Mathematical preparation should include trigonometry or calculus.

#### 5. Statistics:

- Statistical methods
- One semesters or two quarters equivalent to ST 351/ST 352 at OSU.
- Available online thru OSU Ecampus.
- **ST 351 Course Content:** Descriptive statistics, random variables, normal distribution, sampling distributions, confidence intervals and hypothesis tests for means using one and two samples. Incorporates statistical software package.
- **ST 352 Course Content:** Simple and multiple linear regression, correlation, analysis of categorical data



### Evaluation and Transferability of Credit

When applying for admission to OSU, only **official** records are used to evaluate eligibility for admission and transferability of credit.

Official transcripts of **all** college work attempted must be submitted directly from the Registrar's Office of each institution. Telefax (fax) credentials are considered official if faxed **directly** from a U.S. school with a cover page. Fax number is 541-737-2482.

OSU accepts in transfer all college-level courses successfully completed at **colleges or universities accredited by an appropriate accreditation agency**. An advanced standing report (ASR) acknowledging the courses accepted by the university will be sent via email by the [Office of Admissions](#) after the official letter of admission.

To search for regionally accredited institutions see the US Dept. of Education, Office of Postsecondary Education database at <http://ope.ed.gov/accreditation/>.

Persons transferring to OSU from a community college may have up to 124 term credits (83 semester credit) accepted toward their bachelor's degree. If the school previously attended is on a semester calendar system, 1.5 quarter credits will be awarded for each semester credit. For example, 3 semester credits will be articulated as 4.5 quarter credits.

For more information on evaluation and transferability of credit, please contact the OSU Admissions office at 800-291-4192.



## Transfer Resources

To view previous coursework that has been evaluated and approved for transfer to OSU see the following online resources: <http://oregonstate.edu/admissions/transfer/transfercredit.html>.

## Transfer Credit and the Environmental Sciences Degree Requirements

Acceptance of transfer coursework by OSU does not presume approval within the ENSC major -- only an ENSC Advisor can approve transfer coursework to meet specific major requirements. This final evaluation occurs once a person has been accepted as a degree-seeking student in the ENSC program, and the [Advance Standing Report](#) has been generated by OSU Admissions.

Prospective students interested in an unofficial evaluation of their transfer credits, prior to admission to OSU, may contact an [Ecampus success counselor](#). Or, use the [transfer resources](#) available through the OSU Admissions office.

Admitted, degree-seeking ENSC students may use the [ENSC online petition form](#) to request a review or re-evaluation of transfer coursework they have completed, or plan to complete, if the transfer resources do not answer the question.



## Why the Basic Science and Math courses are important

*Wisdom from former ENSC Director, Pat Muir*

It is not uncommon for students who are not clear about their goals when they have gotten started on their program, will ask why the basic math and science classes are necessary at all for any real work experience.

So why should you?

For ENSC degree-seeking students, grounding in biology, chemistry, physics, math and statistics is essential if one wants to understand environmental issues from a scientific basis. Ecology, climate change, water science, fisheries and wildlife sciences, and environmental conservation and sustainability are all grounded in science.

You can't REALLY understand, for example, what is happening, why it is happening, and what is predicted for the future regarding climate change if you don't understand something about atmospheric chemistry and physics. You can't REALLY evaluate claims that you read in journals or in the lay press about any environmental issue if you don't understand statistics, and aren't able to bring those understandings to bear to help you assess validity, etc.

One can certainly acquire an understanding of environmental issues without such background -- many non-scientists do -- but it is constrained to be a much more superficial understanding if you don't have "the roots." And certainly, if one wants to go into the world and claim that they are an environmental SCIENTIST (which is what our degree entitles you to do), you better have a science background, or you are masquerading as something you're not.

If one wants to keep the option open of attending graduate school in any science field, the expectation will most commonly be that you have this kind of background. (Not all programs require it, of course, but many do!)

If you didn't acquire this experience as an undergrad, and want to participate in a graduate program that does require such background, you'll either have to take "remedial" courses before even applying or, as is the case in my dept (BPP), take the courses for undergraduate credit while a graduate student, which obviously slows (significantly) your progress through graduate school!

Environmental Sciences graduate students have had good success in getting into law school, and one of their one of the praises of their backgrounds is their solid training in the fundamentals of science.

If one is contemplating a career as a teacher (middle or high school) in any science related field, they better have a good science background, or they won't be able to do that.