# *CourseSource* Lesson Manuscript Preparation Instructions

## The review Process

Thank you for preparing a submission to *CourseSource*! Your manuscript will be assigned to a Course Editor, based on its scientific topic and the course in which you taught it. Manuscript review occurs in two stages.

1. Peer Review

Reviewers who have stated expertise in your Lesson’s scientific topic will review the accuracy of the Lesson’s scientific content, the “replicability,” i.e., whether it includes all of the information needed to teach the Lesson, and suitability for publication in *CourseSource*.

1. Synthesis of Peer Reviews and Recommendation for Publication by the Course Editor

Based on the reviews and their reading of the Lesson, the Course Editor will decide whether or not to recommend the Lesson for publication, publication with revision, publication after significant revision and re-review, or rejection. The Course Editor will synthesize the reviewers’ comments so that you understand the decision and can plan what to do next. The Editor-in-Chief will send this information to you, along with additional suggestions or questions to address.

## *CourseSource* Style

Once your manuscript has been approved for publication by the Editor-in-Chief, it will be sent to a Senior Editor. The Senior Editor will collaborate with you to revise your manuscript to meet the *CourseSource* style. This process will include copy-editing to supplement editorial suggestions.

The audience of *CourseSource* includes people who are new to teaching or who are teaching outside their scientific specialty. Therefore, *CourseSource* articles should have a writing style that supports the ability of novices to teach the lesson. *CourseSource* style criteria include:

### Simplicity, Clarity, and Readability

* Use sentences that are less than three lines long wherever possible.
  + - Minimize the number of clauses in a sentence.
    - Minimize the number of phrases in a sentence that contain words such as “of,” “about,” or “that.” (One strategy is to cross out all words that have four or fewer letters and retain only the essential ones.)
* Keep the subject and verb of the sentence close to each other.
* Use the least complicated words possible.

### Active Voice

* Use active voice unless passive voice is essential for meaning.

### First and second person and Imperatives

* Use a conversational tone that includes “I,” “we,” and “you.”

Example: “We liked how students responded to the challenge.”

* Use direct instructions (imperatives).

Example: “Do not hand out the second page until students have turned in the first page.”

### Replicability

* Include step-by-step instructions for teacher and student preparation for the Lesson. Provide and explain the materials, resources, and information needed to teach the Lesson. (It might be helpful to think of your Lesson plan as a teaching “protocol,” analogous to an experimental protocol.)

## EXamples

***Original****: In this Lesson, we describe a classroom activity that demonstrates how genes with multiple exons are transcribed and spliced, focusing on a single gene with complex splicing patterns.*

**Revised**: This lesson demonstrates how genes with multiple exons are transcribed and spliced. Students use paper strips to model three splice variants of the BDNF gene and predict the protein encoded by each mRNA. *(Note that the passive is appropriate in this revision, since the subject of the first sentence needs to be “genes.”)*

***Original****: Students will consider how the accuracy of the promoter prediction model could be improved, considering the biological features of transcription and how to represent these features in a computer program.*

**Revised**: Students will consider how to improve the promoter prediction model, in light of computer representations of transcriptional processes.

**Notes:**

Wild type: if “type” is used as a noun, do not hyphenate: “The wild type grew faster.” If the two words are used together as an adjective, hyphenate: “The wild-type strain grew faster.”

Avoid using “this” as a noun. Use as an article. Instead of, “This is correct,” use “This calculation is correct.”

## general Information

**Please conduct a spelling and grammar check through your word processor prior to submission.**

**Length of a Lesson:** As a general rule, Lesson articles should be approximately 4000 words long, excluding references and supporting materials. We will consider longer articles if the additional length is needed to adequately communicate the Lesson.

**Figures, Images, and Tables:** *Do not**include these items in the text file.* Provideeach item as a separate file. Tables should be in separate docx files (see the Table Template for guidance). Images and graphics should be in separate EPS, PNG or JPEG files, with a minimum resolution of 300 DPI.

Replace all of the [explanatory text enclosed in brackets] with your own text. Prior to submission, please delete the pages with the shaded background.

*The Lesson Template begins on the next page.*

**Please use this template1 to prepare your manuscript so that your document will be in the correct format for uploading, including page and line numbers.**

*1Lesson template guided by Journal of Microbiology & Biology Education Curriculum Manuscript Submission* [*Guidelines*](http://jmbe.asm.org/asm/pages/files/JMBE%20Curriculum%20Section%20Author%20Guidelines.pdf) *and Science Magazine Article Submission* [*Template*](http://www.sciencemag.org/site/feature/contribinfo/prep/index.xhtml)

[Replace Text Here with Your Title]

[Replace this paragraph with the author list. List authors by first name (optional middle initial or middle name) followed by last name. Separate multiple authors by commas. Use superscript numbers to link authors to specific affiliations, and symbols (\*, †, ††) for author notes, such as corresponding author.

For example, First Middle Last1\*, First Last2†, and First M. Last1]

**Affiliations:**

1Precede each affiliation by a superscript number corresponding to the author list.

2Each affiliation should be in a separate paragraph.

\*Correspondence to: Use an asterisk to indicate the corresponding author(s); include the postal mail and email addresses of the corresponding author(s).

†Use symbols to indicate additional author notes (for example, for current addresses, type of contribution, etc.).

**Type of Manuscript:** *CourseSource* Lesson Manuscript

**Funding and Conflict of Interest:** [Replace this paragraph in your manuscript. Sources of outside support for the creation of the resource must be named in the contributed manuscript. Please indicate funding that relates to a potential conflict of interest. Conflict of interest exists when an author has financial, personal, or professional relationships that could inappropriately bias or compromise their actions. If no authors have conflicts of interest related to this manuscript, please indicate: “None of the authors has a financial, personal, or professional conflict of interest related to this work.”]

**Copyright:** [Replace this paragraph in your manuscript. The authors must affirm that they either own the copyright to or have received written permission to use the text, figures, tables, artwork, abstract, summaries, and supporting materials. *CourseSource* applies the [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/), to all publications. Under this license, authors retain ownership of the copyright to their article, but allow anyone to download, reuse, reprint, modify, distribute, and/or copy the article, as long as the original authors and source are cited and the intended use is not for commercial purposes.]

**Title and Description of Primary Image:** [We ask that you submit an image with the manuscript that represents the information in the article (e.g., a picture of a dividing cell for a Lesson about mitosis; a picture taken of students doing the activity). This image will be displayed with the title of your article on the *CourseSource* website. **Ensure that this image is not copyrighted.**]

# Abstract

[Replace this paragraph with your abstract. The abstract should be a single paragraph of 250 words or less. Start with an opening sentence that sets the teaching challenge that you address in this manuscript, provide background information specific to this Lesson, briefly describe the Lesson, and end with a concluding sentence.]

***[Delete shaded pages prior to submission]***

***Article Context*** *(provided for your information only; will be required during submission process)*

To make the submission process easier, you may want to examine the following form before writing your article. You will need to select all applicable options that **describe the conditions IN WHICH THE LESSON WAS ACTUALLY TAUGHT**.

**Course**

* Anatomy-Physiology
* Biochemistry and Molecular Biology
* Bioinformatics
* Cell Biology
* Developmental Biology
* Ecology
* Evolution
* Genetics
* Immunology
* Introductory Biology
* Microbiology
* Neurobiology
* Plant Biology
* Professional Development and Career Planning
* Science Process Skills
* Toxicology

**Course Level**

* Introductory
* Upper Level
* Graduate
* High School
* Other

**Class Type**

* Lecture
* Lab
* Seminar
* Discussion Section
* On-line
* Other

**Audience**

* Life Sciences Major
* Non-Life Science Major
* Non-Traditional Student
* 2-year College
* 4-year College
* University
* Other

**Class Size**

* 1 – 50
* 51 – 100
* 101+

**Assessment Type**

* Assessment of individual student performance
* Assessment of student groups/teams
* Assignment
* Exam/quiz, in class
* Exam/quiz, take home
* Homework
* Answer clicker-type question(s)
* Answer essay question(s)
* Answer fill in the blank question(s)
* Answer multiple choice question(s)
* Answer short answer questions(s)
* Answer true/false question(s)
* Create a concept map
* Create a diagram, drawing, figure, etc.
* Create a website
* Create graph, table etc. to present data
* Design an experiment or research study
* Design/present a poster
* Give an oral presentation
* Informal in-class report
* Interpret data
* Order items (e.g., strip sequence)
* Participate in discussion
* Peer evaluation
* Post-test
* Pre-test
* Produce a video or video response
* Respond to metacognition/reflection prompt
* Self-evaluation
* Solve problem(s)
* Written assignment: One minute paper
* Written assignment: Brochure
* Written assignment: Essay
* Written assignment: Figure and or figure legend
* Written assignment: Lab report
* Written assignment: Literature review
* Other

**Lesson Length**

* Portion of one class period
* One class period
* Multiple class periods
* One term (semester or quarter)
* One year
* Other

**Key Scientific Process Skills**

* Reading research papers
* Reviewing prior research
* Asking a question
* Formulating hypotheses
* Designing/conducting experiments
* Predicting outcomes
* Gathering data/making observations
* Analyzing data
* Interpreting results/data
* Displaying/modeling results/data
* Communicating results

**Pedagogical Approaches**

* Think-Pair-Share
* Brainstorming
* Case Study
* Clicker Question
* Collaborative Work
* One Minute Paper
* Reflective Writing
* Concept Maps
* Strip Sequence
* Computer Model
* Physical Model
* Interactive Lecture
* Pre/Post Questions
* Other

**Bloom’s Cognitive Level (based on learning objectives & assessments)**

* Foundational: factual knowledge & comprehension
* Application & Analysis
* Synthesis/Evaluation/Creation

**Principles of how people learn**

* Motivates student to learn material
* Focuses student on the material to be learned
* Develops supportive community of learners
* Leverages differences among learners
* Reveals prior knowledge
* Requires student to do the bulk of the work

**Vision and Change Core Concepts**

* Evolution
* Structure and Function
* Information flow, exchange and storage
* Pathways and transformations of energy and matter
* Systems

**Vision and Change Core Competencies**

* Ability to apply the process of science
* Ability to use quantitative reasoning
* Ability to use modeling and simulation
* Ability to tap into the interdisciplinary nature of science
* Ability to communicate and collaborate with other disciplines
* Ability to understand the relationship between science and society

**Key Words:** List 3 to 10 key words that are relevant for the Lesson (e.g., mitosis; meiosis; reproduction; egg; etc.)

## Scientific Teaching Context

### Learning Goal(s)

### [Replace these instructions and examples (enclosed in brackets) with your learning goals. Provide clearly stated learning goals, which are broad statements of what the students will know once they have completed the Lesson. Learning goals are typically rather abstract and use words like “know,” “understand,” and “value.” (Appreciate should not be used as a synonym for “understand.” Avoid using “appreciate” unless you intend it to mean “value,” as in “Students will appreciate the role of science in society.”)

### For example:

### Students will understand the steps of mitosis.

### Students will appreciate the importance of mitosis in the process of reproduction.

### \*\*Please also list any society generated learning goals that align with your lesson. This helps readers find your lesson when searching by society generated learning goals. Briefly go through the Course Learning Frameworks, if available, for the Course(s) that you identified as the area(s) for this lesson. These learning frameworks can be found on the *CourseSource* website (<https://www.coursesource.org/courses>), under the “Courses” tab. You are welcome to use learning goals from multiple Courses in your Lesson.

### For example, the above Lesson Learning Goals, could align with the following society-generated learning goals:

### From Genetics Learning Framework:

### “What are the molecular components and mechanisms necessary to preserve and duplicate an organism’s genome?”

### “What are the mechanisms by which an organism’s genome is passed on to the next generation?”

### From Cell Biology Learning Framework:

### “How do cells conduct, coordinate, and regulate nuclear and cell division?”]

### Learning Objective(s)

### [Replace these instructions and examples (enclosed in brackets) with your learning objectives. Define what students who have successfully accomplished the learning goal can actually do. Learning objectives describe student behaviors that are observable, measurable, and testable. Learning objectives should test students’ mastery of the material and use words like “define,” “predict,” “design,” and “evaluate.”

### For example:

### Students will be able to compare and contrast mitosis and meiosis.

### Students will be able to predict consequences of abnormal meiosis.]

## Introduction

[Replace these instructions (enclosed in brackets) with your introduction. The introduction should provide the origin and rationale for the design of the Lesson and provide enough background information to allow the reader to evaluate the Lesson without referring to extensive outside material. Focus on how you actually taught the Lesson; suggestions for adaptations should go in the Discussion.

Place your work in the context of the published work of others. Reference and summarize all sources relating to any part of the Lesson.  The introduction should include background scientific information along with references to similar lessons or approaches, if they exist (i.e., documentation of the author's analysis/synthesis of related published articles). Talk about how your Lesson builds on the activities, assessments, etc. of others.

For complex topics, you may submit a “Science Behind the Lesson” article with the Lesson, to provide potential instructors with sufficient information to implement the Lesson.]

### Intended Audience

[Replace these instructions (enclosed in brackets) with a description of your intended audience. Describe the student population(s) who were engaged in the Lesson, including their level and major affiliation. For example: first-year students at a large research university; science majors at a community college; non-science majors in a summer research program; advanced biology students at a liberal arts college, etc.]

### Required Learning Time

[Replace these instructions (enclosed in brackets) with a description of the time needed to complete the Lesson, keeping in mind potential alternate Lesson timelines that may be described in the discussion section.]

### Prerequisite Student Knowledge

[Replace these instructions (enclosed in brackets) with a description of the knowledge and skills that students should have before completing this Lesson. Prerequisite knowledge may include both skills and background content knowledge.]

### Prerequisite Teacher Knowledge

[Replace these instructions (enclosed in brackets) with a description of the prerequisite knowledge that an instructor needs to teach this Lesson. Prerequisite knowledge may include both skills and background content knowledge.]

## Scientific Teaching Themes

[Replace these instructions (enclosed in brackets) with a description of how the Lesson relates to the Scientific Teaching Themes of:

### Active Learning

[Replace these instructions (enclosed in brackets) with answers to this question: How will students actively engage in learning the concepts? List and/or explain the active learning strategies used in the Lesson. For example, activities could include think-pair-share, clicker questions, group discussion, debate, etc. Include both in-class and out-of-class activities. Consider referencing literature that aligns with techniques used in the Lesson.]

### Assessment

[Replace these instructions (enclosed in brackets) with answers to these questions: How did the instructors measure learning? How did students self-evaluate their learning? List and/or explain the kinds of assessment tools used to measure how well students achieved the learning objectives. For example, assessments might be clicker questions, forced choice questions, exams, posters, etc.]

### Inclusive Teaching

[Replace these instructions (enclosed in brackets) with answers to this question: How is the Lesson designed to include all participants and acknowledge the value of diversity in science? List and/or explain how the Lesson is inclusive and how it leverages diversity in the classroom and beyond. For example, the Lesson may use multiple senses and provide examples of scientists from different backgrounds. Consider referencing literature that aligns with inclusive teaching practices used in the Lesson.]

## Lesson Plan

[Replace these instructions (enclosed in brackets) with a description of the Lesson that is complete and sufficiently detailed that a teacher with less skill or scientific expertise in this area than yours would be able to teach it. This section should capture how you would explain to a colleague how to teach your class for you. Focus on how you actually taught the Lesson; suggestions for adaptations should go in the Discussion. Reference Supporting Materials throughout the Lesson Plan section. For example, “Transitions through the activity are important for setting up clicker questions and whole class discussion questions (Supporting File S1. Untangling the central dogma – Lecture slides).”

More information about naming Supporting Materials is included below.

For clarity, you may need/want to include subsections, such as “Pre-class Preparation” and “In-class Lecture Script.” Add subheadings as needed, following the embedded styles in Microsoft word, accessible from the HOME tab:

#### Heading 4

##### Heading 5

**Please include a Table (created in Microsoft Word) containing a recommended timeline for the Lesson. \*This table should be uploaded as a separate document, along with other tables. A recommended Table Template is available on** [**https://www.coursesource.org/for-authors**](https://www.coursesource.org/for-authors)**.**

In addition: expand upon aspects of scientific teaching that are particularly highlighted in the Lesson; provide examples of formative and/or summative assessments and related rubrics; and list materials that are necessary or useful for teaching the Lesson, whether they are provided as supporting materials or as links to other websites.]

## Teaching Discussion

[Replace these instructions (enclosed in brackets) with your observations about the Lesson’s effectiveness in achieving the stated learning goals and objectives, student reactions to the Lesson, and your suggestions for possible improvements or adaptations to different courses or student populations. If you include student performance data, for example pre/post scores on an assessment, please include IRB information.

Subheadings can be included within the sections above to increase readability and clarity, following the embedded styles in Microsoft Word, accessible from the HOME tab:

#### **Heading 4**

##### Heading 5]

## SUPPORTING MATERIALS

[Replace these instructions (enclosed in brackets) with a list of your supporting files. Wherever possible, ensure that the article title and authors are visible when a reader opens the file, either in a header, on the first page/first slide, or as a “Notes” sheet in a spreadsheet workbook. **Upload a separate file for each supporting material item when you submit your article. Do not embed any of this information in this text file.]**

**Title for Supporting Materials**

1. Begin with the letter “S” and the number representing the order in which the material is referenced in the article (S1, S2, S3…). Follow with a short version of your article title (so that readers can easily tell the article associated with the supporting material after it has been downloaded). For example, shorten “Got Algae? A Sorting Game for Introducing the Weird and Wonderful Diversity of Algae,” to “Got Algae.” Include a description of the resource, such as lecture slides, worksheet, etc.

**Examples:**

S1. Got Algae – Organism Cards

S2. Breaking Bricks – Introduction Slides

1. When naming the supporting files that will be uploaded to the website, please save file as the same title as above.
2. When referencing supporting files within the text, please use the same title as above.

**Example of in-text supporting file reference:**

Print one set of algae cards for the sorting game (S1. Got Algae – Organism Cards).

1. When possible, please use **editable file formats** such as Word, PowerPoint, Excel, etc. Avoid PDFs if possible – PDFs are difficult to be made accessible as well as hard for reviewers, editors, and readers to edit.
2. The maximum size for each supporting file is 100 MB.
3. In supporting files that contain lecture slides, it is helpful to include notes about materials and transitions to help the reader teach the lesson.
4. **IMPORTANT:** Ensure that no copyrighted materials are included in your Lesson *or* in your Supporting Materials.

To help the reviewers, throughout the manuscript note which images you drew, which ones are open source (with citation), and which ones are reprinted with permission (with citation and indication of how permission was obtained). If none of these categories apply, you can put in the URL and a brief description of the image. For example, “Put image of DNA here, example can be found at: *add URL.*]

## Acknowledgments

[Replace these instructions (enclosed in brackets) with your acknowledgements, which can include funding information. Include IRB information here or elsewhere in your article, if needed.]

## References

[Replace these instructions (enclosed in brackets) with your reference list. Cite references in the text by placing the reference number in parenthesis; number the references in the order in which they appear in the text. If you are using reference organization software, please make sure to save an unlinked version before submitting your manuscript to *CourseSource*.

The reference list is comprehensive and spans the text, figure captions, and materials.

Number references in the order in which they appear in the text. Follow [ASM style](http://jmbe.asm.org/asm/pages/files/asmstyleguidesreferences.pdf) (with DOI numbers added) and abbreviate names of journals according to the list in [NCBI](http://www.ncbi.nlm.nih.gov/nlmcatalog/journals). List all authors of the reference. List DOI numbers for articles if available. To [edit citation styles in Zotero](https://docs.google.com/document/d/1nfWqDlhWJC8BsyGmuI4KBUv7LCyEMMI3_WFqpw5qrCo/edit?usp=sharing), visit the linked Google Document provided by Megan Carlton, science librarian at the University of North Carolina Greensboro (which she created for *CourseSource* authors).

Examples of reference style:

1. Knight JK, Wood WB. 2005. Teaching more by lecturing less. Cell Biol. Educ. 4:298-310. doi: 10.1187/05-06-0082.
2. Handelsman J, Miller S, Pfund C. 2006. *Scientific Teaching*. New York, NY: W.H. Freeman.

If multiple references are cited in the same citation, number them by date order with the oldest citation as the lowest number.

**\*For websites,** please list hyperlinks in the text itself and not the reference list. For accessible hyperlink formatting: provide the linked anchor text (and actual URL in parentheses – this will be removed prior to publication but will ensure correct links). The blog [Quick Guide for Accessible Hyperlinks](https://www.boia.org/blog/quick-guide-to-accessible-hyperlinks) might be useful.

**Example:** Student watch a [short video about photosynthesis](https://www.youtube.com/watch?v=2KZb2_vcNTg) (<https://www.youtube.com/watch?v=2KZb2_vcNTg>) prior to the activity.

The actual URL in parentheses will be removed prior to publication.]

## Table and Figure Legends

[Delete these instructions (enclosed in brackets) before submitting your article. **Upload a separate file for each figure and table when you submit your article. Do not embed any of this information in this text file.]**

## Tables

Table 1. Table legends should contain a short description of the table.

## Figures

Figure 1. The figure legend should begin with a sentence that describes the overall “take home message” of the figure. Indicate figure parts with capital letters (**A**).

**IMPORTANT:** Ensure that no copyrighted materials (without permission) are included in your article *or* in your tables or figures.