Affordable Materials Grants, Round 18:

Transformation Grants

(Fall 2020 – Fall 2021)

Proposal Form and Narrative

# Notes

* The proposal form and narrative .docx file is for offline drafting and for our review processes. Submitters must use the online Google Form for proposal submission.
* The only way to submit the official proposal is through the online Google Form. The link to the online application is on the [Round 18 RFP Page](https://www.affordablelearninggeorgia.org/about/rfp_r18).
* The italic text provided below is meant for clarifications and can be deleted.

# Applicant and Team Information

*The* ***applicant*** *is the proposed Project Lead for the grant project. The* ***submitter*** *is the person submitting the application (which may be a Grants Officer or Administrator). The submitter will often be the applicant—if so, just list leave the submitter blank.*

| Requested information | Answer |
| --- | --- |
| Institution(s) | Clayton State University |
| Applicant name | Dmitriy Beznosko |
| Applicant email  | dmitriybeznosko@clayton.edu |
| Applicant position/title | Assistant Professor |
| Submitter name  |  |
| Submitter email  |  |
| Submitter position/title |  |

Please provide the first/last names and email addresses of all team members within the proposed project. Include the applicant (Project Lead) in this list. Do not include prefixes or suffixes such as Ms., Dr., Ph.D., etc.

| Team member | Name | Email address |
| --- | --- | --- |
| Team member 1 | Dmitriy Beznosko | dmitriybeznosko@clayton.edu |
| Team member 2 | Tatiana Krivosheev | tatianakrivosheev@clayton.edu  |
| Team member 3 | Brian Roberts | instructional technologist From CSU brianroberts@clayton.edu  |
| Team member 4 |  |  |
| Team member 5 |  |  |
| Team member 6 |  |  |

If you have any more team members to add, please enter their names and email addresses in the text box below.

|  |
| --- |
|  |

# Project Information

| Requested information | Answer |
| --- | --- |
| Priority Category / Categories*Projects in these categories will receive three extra points in the final score for fitting a priority of these particular rounds of Transformation Grants. The type of funding for the project is determined by the funding categories criteria above. As of Round 18, projects can be a part of more than one category. Note that the below categories only indicate priority, not which applications qualify for a grant. Select all that apply.* | *Priority categories:* * ***Collaborative Projects with Professional Support***
* ***Student Participation in Materials Evaluation and/or Development***
* *Эти два вроде как нет*
* *Departmental Scaling Projects*
* *Upper-Level Campus Collaborations*

*Otherwise, put “None.”*  |
| Requested Total Amount of Funding*$30,000 maximum total award per grant* | *$27,550* |
| Final Semester of Project | *Fall 2021* |
| Using OpenStax Textbook?*This is to indicate to OpenStax that they can provide additional support and resources to your team during the adoption process.* | *Yes* |

# Impact Data

Please fill in the data below with impact data in below with *one course taught by one instructor* in each table, and only include courses and instructors that are specifically part of the scope of this grant proposal. Add or remove tables as needed. **Please only put a single averaged or totaled (as appropriate) number in each box. Do not put ranges or mathematical equations in any of these boxes.**

For a multi-course project, if a significant amount of students are assumed to take courses in a sequence and only one textbook is used for these courses, please take this into account in your total *(i.e. only include that book in the first course they would purchase it for OR adjust the number of students affected. Please explain in the notes section if making such adjustments).*

## Course 1

| Row # | Requested information | Answer |
| --- | --- | --- |
| N/A | Course title and number | Solar System Astronomy - ASTR 1010 |
| N/A | Course instructor | Dmitriy Beznosko |
| 1 | Average number of students enrolled per section | 26 |
| 2 | Average number of affected course sections scheduled in a summer semester | 1  |
| 3 | Average number of affected course sections scheduled in a fall semester | 2 |
| 4 | Average number of affected course sections scheduled in a spring semester | 2 |
| 5 | Total number of course sections scheduled in an academic year *Add up rows 2-4.* | 5 |
| 6 | Total number of student section enrollments per academic year*Multiply row 1 and row 5.* | 130 |
| 7 | Original required commercial materials*Include each title, author, price for a new copy purchased from either your campus bookstore, the publisher, or Amazon, and a URL to the book showing the price.* | 1. Cosmic Perspective - W/Master. Astronomy Bennett Edition 9TH 20 ISBN 978013498893

Price new: $230.001. Modified Mastering astronomy T/A Cosmic Bennett Edition 9TH 20 ISBN 978013520811

Price new: $0 with textbook purchase (one semester)Link to bookstore (same for 1 and 2):<https://apps.clayton.edu/courses/sections/202008/81601>(link to another section)<https://apps.clayton.edu/courses/lists/202008/CD84>  |
| 8 | Original cost per student section enrollment*Add up the cost of all materials in row 7.* | $230 |
| 9 | Average post-project cost per student section enrollment | $0 |
| 10 | Average post-project savings per student section enrollment*Subtract row 9 from row 8.* | $230 |
| 11 | Projected total annual student savings per academic year*Multiply row 10 and row 6.* | $ 29,900 |

## Course 2

|  |  |  |
| --- | --- | --- |
| Row # | Requested information | Answer |
| N/A | Course title and number | Principles of Physics I - PHYS 2211Or just say Principles of Physics sequence (PHYS2211 and PHYS2212) and increase numbers below |
| N/A | Course instructor | Tatiana Krivosheev |
| 1 | Average number of students enrolled per section | 27 |
| 2 | Average number of course sections scheduled in a summer semester | 0 |
| 3 | Average number of course sections scheduled in a fall semester | 1 |
| 4 | Average number of course sections scheduled in a spring semester | 1 |
| 5 | Total number of course sections scheduled in an academic year *Add up rows 2-4.* | 2 |
| 6 | Total number of student section enrollments per academic year*Multiply row 1 and row 5.* | 54 |
| 7 | Original required commercial materials*Include each title, author, price for a new copy purchased from either your campus bookstore, the publisher, or Amazon, and a URL to the book showing the price.* | University Phys. W/Mod.Phys. - Mod.Master. Young Edition 15TH 20 ISBN 978013520634Price new: $157.15<https://apps.clayton.edu/courses/sections/202008/81272>  |
| 8 | Original cost per student section enrollment*Add up the cost of all materials in row 7.* | $157.15 |
| 9 | Average post-project cost per student section enrollment | $0 |
| 10 | Average post-project savings per student section enrollment*Subtract row 9 from row 8.* | $157.15 |
| 11 | Projected total annual student savings per academic year*Multiply row 10 and row 6.* | $ 8,486.1 |

##  Course 3

|  |  |  |
| --- | --- | --- |
| Row # | Requested information | Answer |
| N/A | Course title and number | Stellar and Galactic Astronomy - ASTR 1020 |
| N/A | Course instructor | Dmitriy Beznosko |
| 1 | Average number of students enrolled per section | 34 |
| 2 | Average number of course sections scheduled in a summer semester | 0 |
| 3 | Average number of course sections scheduled in a fall semester | 1 |
| 4 | Average number of course sections scheduled in a spring semester | 1 |
| 5 | Total number of course sections scheduled in an academic year *Add up rows 2-4.* | 2 |
| 6 | Total number of student section enrollments per academic year*Multiply row 1 and row 5.* | 68 |
| 7 | Original required commercial materials*Include each title, author, price for a new copy purchased from either your campus bookstore, the publisher, or Amazon, and a URL to the book showing the price.* | 1. Cosmic Perspective - W/Master. Astronomy Bennett Edition 9TH 20 ISBN 978013498893

Price new: 0.00 (from ASTR 1010)1. Modified Mastering astronomy T/A Cosmic Bennett Edition 9TH 20 ISBN 978013520811

Price new: $121.40 (per semester)<https://apps.clayton.edu/courses/sections/202008/81456>  |
| 8 | Original cost per student section enrollment*Add up the cost of all materials in row 7.* | $121.40 |
| 9 | Average post-project cost per student section enrollment | $0 |
| 10 | Average post-project savings per student section enrollment*Subtract row 9 from row 8.* | $121.40 |
| 11 | Projected total annual student savings per academic year*Multiply row 10 and row 6.* | $ 8,255.20 |

## Course 4

|  |  |  |
| --- | --- | --- |
| Row # | Requested information | Answer |
| N/A | Course title and number | Principles of Physics II - PHYS 2212 |
| N/A | Course instructor | Tatiana Krivosheev |
| 1 | Average number of students enrolled per section | 14 |
| 2 | Average number of course sections scheduled in a summer semester | 1 |
| 3 | Average number of course sections scheduled in a fall semester | 1 |
| 4 | Average number of course sections scheduled in a spring semester | 1 |
| 5 | Total number of course sections scheduled in an academic year *Add up rows 2-4.* | 3 |
| 6 | Total number of student section enrollments per academic year*Multiply row 1 and row 5.* | 42 |
| 7 | Original required commercial materials*Include each title, author, price for a new copy purchased from either your campus bookstore, the publisher, or Amazon, and a URL to the book showing the price.* | University Phys. W/Mod.Phys. - Mod.Master. Young Edition 15TH 20 ISBN 978013520634Price new: $157.15<https://apps.clayton.edu/courses/sections/202008/81272> |
| 8 | Original cost per student section enrollment*Add up the cost of all materials in row 7.* | $0\* |
| 9 | Average post-project cost per student section enrollment | $0 |
| 10 | Average post-project savings per student section enrollment*Subtract row 9 from row 8.* | $0 |
| 11 | Projected total annual student savings per academic year*Multiply row 10 and row 6.* | $0 |

\*This is the second course of a Principles of Physics sequence. Students participating in the course typically already have a required textbook.

# Narrative Section

## 1. Project Goals

The Solar System Astronomy (ASTR 1010) is one of the Core Curriculum courses at CSU. Around 200 students take it every year. The Stellar and Galactic Astronomy (ASTR 1020) is the second astronomy course as CSU that has ASTR 1010 as a pre-requisite and has an associated laboratory component. The Principles of Physics (PHYS 2211 and PHYS2212) is the required course sequence for Chemistry, Math, Computer Science and pre-Engineering majors at CSU with up to a 100 students taking it every year. We plan to achieve the following project goals with this Round 18 Textbook Transformation Grant:

- Adopt an open textbook from OpenStax “Astronomy” ISBN-10: 1-947172-24-7 for ASTR 1010 and ASTR 1020, and the “University Physics” volume 1 ISBN-10: 1-947172-20-4 for PHYS 2211 and PHYS2212.

- Adopt test banks from OpenStax for the new textbooks.

- Using the test banks, develop pre-class quizzes to encourage students to come prepared to lecture as part of active-learning strategy, as well as quiz and exam questions pool.

- Redesign lecture notes/presentations based on the newly adopted textbooks

- Develop with student participation audio-video materials illustrating difficult concepts of each course where videos at appropriate level are not readily available from internet. All videos will be made accessible using university captioning services.

- Develop free simple online tools to help students carry out creative astronomy projects that will be conveniently available to students via D2L reducing the amount of time spent on in-class lecture in favor of active-learning strategies such as group activities and projects.

- Develop free supplementary materials in a form of interactive online simulations with gaming elements that will allow students to practice basic physics concepts covered in class.

- Assess the effect of no-cost textbook on student learning

- Make all developed materials available as ‘open access’ via different providers based on material content. For example, video materials can be shared via YouTube; source code can be shared via GitHub, etc.

## 2. Statement of Transformation

Solar System Astronomy (ASTR 1010) course is the most popular science course for non-science majors offered by the Chemistry and Physics Department at the Clayton State University. There is a second astronomy course at CSU - Stellar and Galactic Astronomy (ASTR 1020). The Principles of Physics (PHYS 2211 and PHYS2212) is a sequence of two courses and it is the required science course that is taken by all Chemistry, Mathematics, Computer Science and pre-Engineering majors at CSU.

It is a well-known fact that textbooks are expensive and the current textbooks for ASTR 1010/1020 and PHYS 2211/2212 are no exception. In a 2018 survey conducted by Morning Consult for Cengage[[1]](#footnote-2) to 1,651 current and former college students ages 18 to 30, 85% noted that its financial stress to get the textbooks, and 43% indicated that they have skipped meals to save money to purchase required course materials. The impact onto students is even harsher in the current crisis caused by the COVID-19 pandemic.

A newly hired CSU faculty member Beznosko is taking over ASTR 1010/1020 courses, therefore, this is a perfect moment for the ASTR 1010/1020 transformation by adopting an open source, no-cost textbook from OpenStax. Dr. Beznosko has a vast background in both the developing new Astronomy courses and in teaching large number of physics and astronomy courses across curriculum; he has experience in implementing active-learning strategies. Taking the adoption of the OpenStax textbook as a motivation, we plan to transform ASTR 1010/1020 to be more accessible to students.

A faculty member Krivosheev has an extensive experience of developing and using no-cost learning materials in teaching Physics. She was a recipient of an Affordable Materials Grant in 2015. The transformation of the laboratory materials to the no-cost Jupyter electronic notebooks was successfully implemented. Latest readership report from Galileo Open Learning Materials shows that users from 18 countries around the world including Canada, China, India, Philippines, Germany and Russia have downloaded these materials. In August 2020 alone, Galileo reports 51 new downloads of the materials. This work has been presented on multiple occasions at professional conferences, with the latest talk in January 2020 as a part of the Best Practices in Educational Technologies session at the 2020 Winter Meeting of the American Association of Physics Teachers.

Tatiana Krivosheev is typically teaching the PHYS 2211/2212 course with other faculty members teaching it occasionally as well. While everything in this section about adopting no-cost textbook and developing new materials is also true for this course, additionally, this transformation will result in the common bank of questions, homework assignments and activities to be shared with other instructors to make the instruction more uniform across different sections and semesters.

A new set of lecture presentations, online quizzes and pre-quizzes, and tools for projects and interactive learning will be developed to reduce time students spend with lecture, and incorporate more active-learning group activities. Audio-video materials will be created by a participating students and interactive simulations and tools will be developed in collaboration with professional support. These materials will be initially deployed through CSU’s Desire to Learn System for students’ access convenience as well as via corresponding ‘open access’ means for each type of the materials. For example: video materials can be shared via courses’ channels in YouTube, the source code for project tools and interactive simulations can be shared via GitHub, the test bank questions can be added as educator resources at OpenStax resources page. The new course delivery is expected to lead to the increase in the enrollment of both courses and to support the student retention into ASTR1020.

## 3. Action Plan

The entire team will come together in January 2021 to finalize the list of selected no-cost online resources. These materials comprise of video clips, animations, existing simulations (including but not limited to PhET Interactive simulations from University of Colorado) and similar. These resources will be integrated into lecture slide sets to generate a comprehensive set of lectures that can be adopted by any future instructors of these courses under transformation.

 Since the order of topics in the current commercial textbooks and the OpenStax textbooks is similar but not exactly the same, the syllabi for all four courses need to be adjusted to conform to the new textbook adoption (both ASTR 1010/1020 and PHYS 2211/2212).

Beznosko will create a set of lecture slides for the ASTR 1010 (chapters 1-14) and for ASRT 1020 (chapters 15-29) courses to correspond to the topics and materials from OpenStax “Astronomy”

Krivosheev will create a set of lecture slides for the PHYS 2211 and PHYS 2212 to correspond to the topics and materials from OpenStax “University Physics” volume 1 and volume 2 respectively.

Krivosheev and Beznosko will create the pre-class quizzes and quiz and exam questions pool following the adoption of tests banks from OpenStax Instructional materials for PHYS and ASTR courses respectively.

Student assistants under the supervision of Krivosheev and Beznosko will evaluate existing video materials and simulation tools available on the internet. They will create a list and develop a plan to make new video materials for both Astronomy and Physics courses where videos at appropriate level are not readily available from internet. A set of new videos will be created specifically for the creative projects to be utilized in both Astronomy and Physics courses. These videos will be created by student assistants with the technical and graphics design support from Roberts and external collaborator.

External collaborator in close contact with Beznosko and Krivosheev will develop online tools to help students carry out creative astronomy projects and the interactive online simulations with gaming elements that will allow students to practice basic physics concepts covered in class.

Roberts in collaboration with Beznosko and Krivosheev will develop metrics for a student satisfaction survey to measure success of the various course components and innovations.

Krivosheev and Beznosko with Roberts’s input will observe each other’s classes in order to aid in adapting the new course activities and any classroom management challenges that arise and to evaluate each other D2L modules for the consistency of teaching materials/style, allowing mid-semester adjustments to be made more effective when needed.

In addition to all newly created materials being available via Affordable Learning Georgia hosting, the video materials will be also available for public through YouTube channels for the courses and the developed software will be shared via GitHub.

## 4. Quantitative and Qualitative Measures

We will measure the success of the textbook adoption and associated course transformation through the following qualitative and quantitative assessments:

**- Student satisfaction survey (qualitative)**

 Surveys will be distributed at the end of each semester to students in order to gauge their perception of how helpful the new textbook and materials available to them appear to be. These surveys will help us gauge student interest and identify the areas of improvement and the components of the course with the most impact on the student learning. Additionally, they will provide us with information on other resources the students may have found when they were studying for the course that could be incorporated into the course(s).

**-Instructor reflection (qualitative)**

The reflections from instructors after each semester ends will provide a qualitative snapshot of the instructor perception of the effectiveness of changes made for each course.

**- Student completion of and performance on pre-class quizzes (quantitative)**

 The completion rate and the students’ success on these pre-class quizzes will show the level of preparation students do before the class using the new textbook and materials and the effectiveness of active-learning strategy.

**- Course enrollment data (quantitative)**

Each semester we will be examining the enrollment data for all four courses. Our goal is to determine if offering open access materials will increase enrollment in these courses.

**- DFW Rate and Grade Point Average (quantitative)**

Through the department chair, we have access to the DFW rates and class grade point average for all students enrolled in ASTR/PHYS during the last three years. At the end of each semester, we will be comparing the DFW rates for the course taught using the new format to those using the purchased textbook.

## 5. Timeline

*This section allows teams to describe how the project will progress from its inception to the Final Report. Please provide a list of major milestones, events, and deadlines, aligned with your Action Plan and the final semester of your project. Include the submission of your Final Report in this list.*

*Do not put this timeline in the form of a table, as it will not transfer well to Google Forms for the official application—a bullet-point list is acceptable.*

Spring semester 2021

* Whole team gets together to identify and select existing no-cost materials to be used. Topics for the video materials and software tools are set following the selection.
* A plan is set for the transformation of PHYS 2211/ASTR 1010 courses and creation of all required materials following new textbook adaptation.
* By semester end, the development of in-class presentations, pre-class quizzes and other materials for PHYS 2211/ASTR 1010 is completed.
* Development starts for: student satisfaction survey and materials for PHYS 2212/ASTR 1020
* Semester Status Report.

Summer semester 2021

* The materials developed during Spring 2021 semester are used to teach PHYS 2211/ASTR 1010.
* Student satisfaction survey is completed and deployed at semester end.
* Student survey and performance data together with DFW rates and class grade point average are used to identify areas of improvements and additions to the courses if and where necessary.
* Development of materials for PHYS 2212/ASTR 1020 is completed or is near completion.
* Semester Status Report.

Fall semester 2021

* Fall 2021 – ASTR 1010/ASTR 1020, PHYS 2211/2212 are fully deployed.
* All development is completed.
* Course enrollment data is collected.
* Final surveys are administered.
* All data from qualitative and quantitative measures deployed is analyzed.
* Final Report at the end of the final semester.

## 6. Budget

Dr. D. Beznosko will develop all lecture slides, quizzes, tests and syllabus adjustments for ASTR courses following new textbook adaptation as well as supervise video and software projects for astronomy and participate in the student satisfaction survey creation. Stipend $5000.

Dr. T. Krivosheev will develop all lecture slides, quizzes, tests and syllabus adjustments for ASTR courses following new textbook adaptation as well as supervise video and software projects for astronomy and participate in the student satisfaction survey creation. Stipend $5000.

B. Roberts will create student satisfaction surveys for PHYS/ASTR courses and participate in class observations, course materials evaluation, assist with multimedia design and final data analysis. Stipend $5000.

External collaborator A. Iakovlev will program the online simulations and online project tools for the students with continued development and support throughout the project in close collaboration with D. Beznosko for ASTR topics and T. Krivosheev for PHYS topics. $20/h, 10h/week for active development during 14 weeks spring semester, and 5h/week of continued development and support during 8 weeks of summer 2021 and 14 weeks of fall 2021 semester – total: $5000

Student assistant #1 M. Gillard will develop multimedia materials with support by B. Roberts and A. Iakovlev and under the supervision of D. Beznosko for ASTR topics and T. Krivosheev for PHYS topics. $10/h, 10h/week for 14 weeks in spring 2021, 6 weeks in summer and 10 weeks in fall 2021 semesters. Total per student assistant: $3000

Student assistant #2 will collect, adopt and convert into usable formats the video and simulation tools from the OER existing on the internet under the supervision of D. Beznosko for ASTR and T. Krivosheev for PHYS topics, and will assist in develop multimedia materials and other tasks as needed. $10/h, 10h/week for 14 weeks in spring 2021 and 20h/week for 8 weeks in summer 2021 semester (ну это мое предположение если студент тут летом будет). Total per student assistant: $3000

Participate in Open Educational Conference 2021 for 2: each $75, total $150

Registration and travel to AAPT or similar conference for 2 - $1400

## 7. Sustainability Plan

Once implemented, all courses (ASTR 1010/1020 and PHYS 2211/2212) affected by the transformation are offered several times during an academic year. Once the materials are posted on D2L, Youtube, GitHub, or/and any other online public repository such as OpenALG and Galileo Open Learning Materials, minimal to no maintenance is required. The team members responsible for the development and initial teaching of the courses will present their development, usage, and lessons learned in the process to the other faculty of Department of Chemistry and Physics at CSU and larger teaching community (through the conference presentations and workshops). Course materials may be updated as necessary by the members of Chemistry and Physics Department to incorporate additional materials, experiments, projects or technologies as needed, and will be shared with all faculty teaching the courses through the online public repository.

Detailed sharing plans:

The developed lecture presentations and video/programming materials will be accessible via OpenALG and Galileo Open Learning Materials

All above materials and pre-class quizzes will be available via shared folder to use within Department. Quizzes and other graded materials are not openly shared for obvious reasons.

All materials will be openly offered to OpenStax for the inclusion to their Instructor Materials. Only registered and verified instructors have access to these materials protecting sensitive parts.

Krivosheev and Beznosko will use the data from the final report to continue making additional improvements to the course materials in subsequent semesters. They will provide continuous support and maintenance for the developed materials.

The results and experience of this work will be shared at the conference on education, such as AAPT (American Association of Physics Teachers) or similar.

The transformation experience and results are currently planned to be shared via article published in an educational magazine such as CBE-Life Sciences Education, Physics Teacher (AAPT publication) or similar.

Creative Commons Terms

*I understand that any new materials or revisions created with ALG funding will, by default, be made available to the public under a Creative Commons Attribution License (CC-BY), with exceptions for modifications of pre-existing resources with a more restrictive license.*

# Accessibility Terms

*I understand that any new materials or revisions created with Affordable Learning Georgia funding must be developed in compliance with the specific accessibility standards defined in the* [*Request for Proposals*](https://www.affordablelearninggeorgia.org/about/rfp_r18)*.*

# Letter of Support

*The Department Chair from the corresponding project, or the Department Chair’s direct report such as the Dean or Provost, must provide a signed Letter of Support for the project. This letter should acknowledge the following:*

* *The department will provide support for fund disbursement in correspondence with the Grants/Business Office.*
* *The department approves of the work on the proposal by the applicant(s).*
* *The department acknowledges the sustainability of the use of these affordable resources after the grant work is complete.*

*In the case of multi-institutional affiliations, all participants’ institutions must provide a letter of support.*

*Please provide the name and title of the department chair (or other administrator) who provided you with the Letter of Support.*

|  |
| --- |
| *Nasser Momayezi, Dean* |

# Grants or Business Office Letter of Acknowledgment

*Institutional Grants/Business Offices will be responsible for fund disbursement, often in correspondence with the Department Chair, including expense and travel reimbursement. Applicants will need to provide a short Letter of Acknowledgment stating that the Grants/Business Office knows about the applicant’s intent to apply for an Affordable Materials Grant. Either the Department Chair or the Project Lead can work with the Grants/Business Office to get this signed letter.*

*In the case of multi-institutional affiliations, all participants’ institutions must provide a letter of acknowledgment.*

*Please provide the name and title of the grants or business office representative who provided you with the Letter of Acknowledgment.*

|  |
| --- |
|  Melody L. Carter, PhD Chief Sponsored Research and Programs Officer |

1. https://news.cengage.com/corporate/new-survey-college-students-consider-buying-course-materials-a-top-source-of-financial-stress/ [↑](#footnote-ref-2)