Affordable Materials Grants, Round 19:

Transformation Grants

(Spring 2021-Spring 2022)

Proposal Form and Narrative

# Applicant and Team Information

| Requested information | Answer |
| --- | --- |
| Institution(s) | Valdosta State University |
| Applicant name | David R. Gibson |
| Applicant email | [dgibson@valdosta.edu](mailto:dgibson@valdosta.edu) |
| Applicant position/title | Professor of Computer Science |
| Submitter name |  |
| Submitter email |  |
| Submitter position/title |  |

| Team member | Name | Email address |
| --- | --- | --- |
| Team member 1 | David R. Gibson | dgibson@valdosta.edu |
| Team member 2 |  |  |
| Team member 3 |  |  |
| Team member 4 |  |  |
| Team member 5 |  |  |
| Team member 6 |  |  |

# Project Information

| Requested information | Answer |
| --- | --- |
| Priority Category / Categories | *Departmental Scaling Projects*  *Student Participation in Materials Evaluation and/or Development* |
| Requested Total Amount of Funding | *$6000 ($5000 for me and $1000 for a student)* |
| Final Semester of Project | *Spring 2022* |
| Using OpenStax Textbook? | *No* |

# Impact Data

## Course 1

| Row # | Requested information | Answer |
| --- | --- | --- |
| N/A | Course title and number | Principles of Programming II, CS 1302 |
| N/A | Course instructors | David R. Gibson |
| 1 | Average number of students enrolled per section | 30 |
| 2 | Average number of affected course sections scheduled in a summer semester | 0 |
| 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.* | 4 |
| 6 | Total number of student section enrollments per academic year  *Multiply row 1 and row 5.* | 120 |
| 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.* | Title: Intro to Java Programming, Comprehensive Version, 10th Edition  Author: Y. Daniel Liang  Price: $175  <https://www.pearson.com/us/higher-education/product/Liang-Intro-to-Java-Programming-Comprehensive-Version-10th-Edition/9780133761313.html> |
| 8 | Original cost per student section enrollment  *Add up the cost of all materials in row 7.* | $175 |
| 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.* | $175 |
| 11 | Projected total annual student savings per academic year  *Multiply row 10 and row 6.* | $21,000 |

# Narrative Section

## 1. Project Goals

I have a rough draft for the text for the course, CS 1302, Principles of Programming II, which has been in development since 2014. This course is a second course in introductory programming in Java. The prerequisite is CS 1301 which covers the basics of procedural programming. The emphasis of CS 1302 is object-oriented programming. Currently, my text is 100% original, 13 chapters, 309 pages, 302 original figures, 100+ annotated examples, and 81 practice coding assignments scattered throughout the text. Solutions are provided to the practice problems; however, these are Java source code files and are not included in page count above. I use the term “practice problems” to differentiate between coding assignments (*i.e.* homework) that are graded and are not a part of this proposal.

My primary goal is to provide a no cost, OER textbook that guides the students to the exact learning outcomes that the ABET accredited, Department of Computer Science (CS) at Valdosta State University (VSU) has specified, in the most efficient way possible, and is tailored to the unique needs of our CS students and that will be used across all sections of CS 1302 that we teach.

To achieve this primary goal, these sub-goals must be met:

1. Review and revise the content for completeness and clarity.
2. Revise the document to meet accessibility guidelines.
3. Add more practice problems and solutions

## 2. Statement of Transformation

Currently, I use portions of my text in the classroom itself, as I teach, but still require a published text book. I have taught this course off and on for the past 15+ years. In the last 7 years, I have taught at least one section every semester, many times, both the sections we offer. I have found it harder and harder to correlate the required text book with the learning outcomes for the course. Much of the material in the required text book is omitted as it does not match our outcomes, goes into too much detail for our students, and doesn’t provide the step-by-step guidance and examples that many of our students require.

This course has a very high DFW rate (45%-60% over the last 5 years). Our CS students have widely varying aptitudes for coding at this stage (second course) in their degree progression. For the significant number of students who struggle with this course, exclusively using my completed text will provide me and other instructors of the course with an efficient means to coach students to learn from my text, examples in the text, and practice problems. This approach will facilitate clearly drawing parallels between the text and expected outcomes on coding assignments and tests.

Utilization of my text will be more efficient in terms of time the students spend learning the material. There are several reasons for this:

* The text contains only the exact concepts and techniques that are required for our learning outcomes.
* I provide detailed explanations at the level that is appropriate for our students.
* I provide annotated, detailed examples, that go further than commercially available text books, that provide a strong bridge to graded coding assignments that are given in the class and to tests. Over many years, I have found our vulnerable and struggling students need this guidance.
* There are 302 (original) figures in the text. Some of these show short snippets of code that are annotated with arrows highlighting different code flows and with text in the images to describe terms, techniques, *etc.* Other figures show snippets of code with the corresponding objects that exist in memory (object diagrams). I’ve found these types of figures very useful in class. However, the problem is that such figures don’t exist in near the quantity in commercially available text books. Further, it is not time efficient to draw these on the board. My approach will be better because I can project the text on the screen in the classroom and spend my time talking about them.

As mentioned previously, the prerequisite for this course is CS 1301. Typically, a single book would be used on a two-course sequence (CS 1301 & CS 1302). In the past, we have used the current text for CS 1302 for both courses. However, we had to abandon it for CS 1301 for the same reasons we would now like to abandon it for CS 1302. Currently, in CS 1301, we use an eBook, “Principles of Programming I” by zyBooks. We have evaluated a version of this product for use in CS 1302; however, we found that it did not meet the needs we have for this course. Assuming this project is successful, in the future we would like to pursue a similar custom text, developed by myself and/or others in the department.

## 3. Action Plan

1. *The role(s) of each team member in the project with details as to the major tasks team members will complete, with an estimate of how long each task will take (e.g. number of hours).*

I will conduct the following activities which in total, I’ve estimated to be approximately 145 hours:

* Review and revise the content for completeness and clarity – 50 hours (on average, 4 hours/chapter for each of the 13 chapters). This includes coordinating with the student (see below) who will be reviewing the text as well.
* Revise the document to meet accessibility guidelines – 58 hours. I’ve estimated:
  + 25 hours to make the 302 figures accessible (on average, 5 minutes/figure to add alt text)
  + 22 hours to make the 263 tables accessible (on average, 5 minutes/table to add caption & header rows properly defined with styles)
  + 5 hours to make the chapter and section headers accessible.
  + 6 hours to restructure instances of using invisible tables for formatting.

The Director of the Access Office, Rebecca Taylor, and Dr. Michael Holt, Marketing and Assessment Coordinator for VSU’s Odum Library have both agreed to provide guidance with these tasks as needed.

* Add additional practice problems – 26 hours (on average, 2 hours/chapter for each of the 13 chapters). The text currently has a reasonable set of application-type practice problems; however, I will add some smaller problems to practice techniques before utilizing them in larger, application practice problems. Also, a few chapters need some additional application type problems.
* Convert chapters to a single pdf with a clickable table of contents at the chapter and section level – 6 hours (on average, 0.5 hours/chapter for each of the 13 chapters)
* Analyze evaluation data and prepare final report – 5 hours.

I have identified an advanced student, who took CS 1302 from me and earned an A+, and who is available this summer (see timeline), to conduct the following activities which in total, I’ve estimated to be approximately 84 hours:

* Review each chapter and communicate with me issues of clarity, errors, typos, *etc.* – 32 hours (on average, 2.5 hours/chapter for each of the 13 chapters)
* Code solutions for new practice problems that I will add to the text – 26 hours.
* Code test cases for some practice problems – 26 hours. Existing practice problems have solutions and, in some cases, have test classes (test code). Software testing is an important part of this course and as such, I need more examples of robust test code.

1. *A review of existing open, no-cost, and/or low-cost course materials for the course(s).*

Galileo doesn’t list any text when searching for, “CS 1302,” the standard name across the USG. Searching for “computer programming,” I did find several texts; however, they were all for an introductory course in programming in Java. There is one text, “Programming Fundamentals,” from Georgia Gwinnett College, from the IT department; however, the link is dead for the full text and could not be found through further search. From the table of contents, it is obviously an introductory course. Another I found, “Programming and Problem Solving I,” again, is an introductory text and there is no link to the text itself.

I found no suitable Java programming texts on OpenStax. I found one Java text, “Think Java - How to Think Like a Computer Scientist,” on LibreTexts; however, it is at the introductory level.

1. *The plan for the selection, adoption, adaptation, and/or creation of new course materials (if applicable). Include plans for open licensing and plans for making your materials accessible.*

n/a

1. *The plan for redesigning your course(s), including any instructional design work, curriculum alignment, course accessibility changes, etc.*

Course accessibility changes were addressed in Section 3.1 above.

1. *The plan for providing open access to the new materials. Affordable Learning Georgia will host any newly created materials in our repository; please indicate if you are using other platforms in addition to the repository to host them.*

I will provide the completed text and solutions to practice problems to USG ALG to be housed on the Galileo Open Learning Materials repository. I will also provide these to VSU’s Vtext repository, [https://vtext.Valdosta.edu](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fvtext.valdosta.edu%2F&data=04%7C01%7Cdgibson%40valdosta.edu%7C966509e6d62f4ce8b91e08d8d9dbd271%7C25a5d3408abc4053b4bddc1213280353%7C0%7C0%7C637498885481949400%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=TG%2BJTOMzTs2mvPbWFWTw6QNEvh8%2BKjppRscA1Kuyams%3D&reserved=0). I will also host the text on my CS 1302 course website.

## 4. Quantitative and Qualitative Measures

I will teach 2 sections of CS 1302 in Fall 2021 and Spring 2022. In each of these 4 sections I will:

* Perform a satisfaction survey in the last 2 weeks of the semester addressing: quality, clarity, and usefulness of the text, the examples in the text, and the practice problems. In addition, I’ll ask about how it helped with homework (coding) assignments and tests. The exact questions are yet to be determined, but will address these things.
* Report DFW rates and compare them to Fall 2018 to the present where I have taught at least one section each semester.
* Compare performance on learning outcomes based on specific test questions to previous semester results. As a part of our ongoing ABET accreditation tasks, we map learning outcomes to specific test questions that are generally kept the same across semesters and professors. As a result, I keep scores for every problem for every test for each student. The tests are mostly identical from semester to semester (they are not returned to the students) and so an ANOVA analysis is straight forward.

## 5. Timeline

I will do almost all the work this summer, April through August: April (20 hrs), May (30 hrs), June (40 hrs), July (40 hrs), and finishing in mid-August (10 hours). This to have the complete text finished by the start of classes on August 16.

* April 2021
  + Learn more about accessibility by watching videos and reading, and consulting with the Access office and Dr. Michael Holt. I have already done a little bit of this and so I have a good idea of the specific types of things that need to be done.
  + Complete the accessibility changes for Chapters 1-2
  + Complete the content revisions and add practice problems for Chapters 1-2.
* May 2021 – Complete the accessibility changes, content revisions, and addition of practice problems for Chapters 3-5.
* June 2021 – Complete the accessibility changes, content revisions, and addition of practice problems for Chapters 6-9.
* July 2021 – Complete the accessibility changes, content revisions, and addition of practice problems for Chapters 10-13.
* August 2021 –
  + Convert chapters to a single pdf with a clickable table of contents.
  + August 16, start semester teaching 2 sections of CS 1302 with the text.
* November 2021 – Develop and administer satisfaction survey to students in the 2 sections.
* December 2021 – Analyze learning outcome quantitative data.
* Jan 2022 – Start semester teaching 2 sections of CS 1302 with the text.
* April 2022 – Administer satisfaction survey to students in the 2 sections.
* May 2022
  + Analyze learning outcome quantitative data.
  + Write final report.

## 6. Budget

I am requesting $5000 for salary for myself and $1000 for the student who will perform the activities outlined above.

## 7. Sustainability Plan

A large part of the development I have done on this rough draft so far has been done over winter break, and in the summers. I will continue this approach to maintain and update the text.

As stated in the letter of support from my department head, Dr. Krishnendu Roy, I will teach all sections of CS 1302 in Fall 2021 and Spring 2022. As I have taught almost all the sections for the last 5 years, I anticipate teaching at least one section for the foreseeable future. My department knows my love of teaching this foundational course and my commitment to excellence in that endeavor.

Related to this proposal, my department head and I have discussed me (or heading a development team) developing a text for CS 1301 that is appropriate for our students and our learning outcomes. We have also discussed, a “live text” revision of the text currently being proposed where students can write code interactively in the text itself. This, of course, would be a large task, but is doable.

I plan to present this work, the approach of the text, at the 2020 ACM Southeast Conference in a STEM education track.

# 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

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| --- |
| Dr. Krishnendu Roy, Department Head & Professor  Department of Computer Science |

# Grants or Business Office Letter of Acknowledgment

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| --- |
| Elizabeth (Ann) W. Olphie, Director  Sponsored Programs and Research Administration |