

Grants Collection

Kennesaw State University



UNIVERSITY SYSTEM
OF GEORGIA

Lei Li, Zhigang Li, Hossain Shahriar, Rebecca Rutherford,
Svetlana Peltsverger, and Dawn Tatum

Wireless Security



Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- **Linked Syllabus**
 - The syllabus should provide the framework for both direct implementation of the grant team's selected and created materials and the adaptation/transformation of these materials.
- **Initial Proposal**
 - The initial proposal describes the grant project's aims in detail.
- **Final Report**
 - The final report describes the outcomes of the project and any lessons learned.



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Initial Proposal

Application Details

Manage Application: ALG Textbook Transformation Grants Round 8

Award Cycle: Round 8

Internal Submission Deadline: Sunday, December 11, 2016

Application Title: 302

Application ID: #001299

Submitter First Name: Lei

Submitter Last Name: Li

Submitter Title: Associate Professor

Submitter Email Address: lli13@kennesaw.edu

Submitter Phone Number: 470-578-3915

Submitter Campus Role: Proposal Investigator (Primary or additional)

Applicant First Name: Lei

Applicant Last Name: Li

Co-Applicant Name(s): --

Applicant Email Address: lli13@kennesaw.edu

Applicant Phone Number: 470-578-3915

Primary Appointment Title: Associate Professor

Institution Name(s): Kennesaw State University

Submission Date: Monday, December 12, 2016

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Zhigang Li, Instructional Technology Specialist & Part-Time Assistant Professor of Information Technology, zli8@kennesaw.edu

Lei Li, Associate Professor of Information Technology, li_lei@kennesaw.edu

Hossain Shahriar, Assistant Professor of Information Technology, hshahria@kennesaw.edu

Rebecca Rutherford, Interim Assistant Dean of the College of Computing and Software Engineering, Chair of the Department of Information technology, and Professor of Information Technology, brutherf@kennesaw.edu

Svetlana Peltsverger, Interim Associate Dean in the College of Computing and Software Engineering and Associate Professor of Information Technology, speltsve@kennesaw.edu

Dawn Tatum, Lecturer of Information Technology, dtatum7@kennesaw.edu

Sponsor, (Name, Title, Department, Institution):

Department of Information Technology

College of Computing and Software Engineering

Kennesaw State University

Proposal Title: 302

Course Names, Course Numbers and Semesters Offered:

IT 6843 - Ethical Hacking: Network Security and Penetration Testing – Offered twice a year in summer & fall semesters.

IT 6833 - Wireless Security– Offered once a year in spring semesters. It's also offer in summer semesters when needed.

IT 6883 - Infrastructure Defense – Offered once a year in fall semesters.

CSE 3801 - Professional Practices and Ethics– Offered three times a year in spring, summer & fall semesters with multiple sections each semester

Average Number of Students per Course Section: 34

Number of Course Sections Affected by Implementation in Academic Year: 25

Total Number of Students Affected by Implementation in Academic Year: 855

- List the original course materials for students (including title, whether optional or required, & cost for each item):**
1. IT4843, Hands-On Ethical Hacking and Network Defense, 2nd Edition, by Michael T. Simpson, Kent Backman, James Corley, ISBN-13: 978-1435486096, 2011. Required. Cost: \$202.30, enrollment:50, total cost: \$10,115.00
 2. IT6843,1) Hands-On Ethical Hacking and Network Defense, 2nd Edition, 2011, by Michael T. Simpson, Kent Backman, James Corley, ISBN-13: 978-1435486096.2) Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition, 2011, Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, Terron Williams, McGraw Hill, ISBN-13: 978-0071742559. Required. Cost: 1) \$202.30;2) \$34.90, Total: 237.20, enrollment: 75, total cost: \$17,790.00
 3. IT6833, Praphul Chandra, 2005, Bulletproof Wireless Security: GSM, UMTS, 802.11, and Ad Hoc Security, Publisher: ELSEVIER, ISBN: 0-7506-7746-5. Required. Cost: \$74.95, enrollment: 40, total cost: \$2,998.00
 4. IT6883, 1) Business Data Communications Infrastructure, Networking and Security (Edition 7th, 2012), William Stallings, Thomas Case, ISBN-10: 0-13-302389-3 ISBN-13: 978-0-13-302389-3; 2) Chained Exploits: Advanced Hacking Attacks From Start to Finish (Edition: 1st, 2009), Andrew Whitaker, Keatron Evans, Jack Voth, ISBN-13: 978-0321498816. Required. Cost: 1)\$161.70, 2). \$45.29, Total: \$206.99, enrollment: 40, total cost: \$8,279.60
 5. CSE3801, A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology, 4th Ed., 2012, by Sara Baase, ISBN-13: 978-0132492676, Required. Cost: \$115.70, enrollment: 680, total cost: \$78,676.00.

Requested Amount of Funding: \$30,000

Original per Student Cost: \$836.94

Post-Proposal Projected Student Cost: \$0

Projected Per Student Savings: \$836.94

Projected Total Annual \$117,843.60
Student Savings:

Creation and Hosting Platforms Used ("n/a" if none):

Kennesaw State University D2L Brightspace

Proposal Category: No-Cost-to-Students Learning Materials

Final Semester of Fall 2017
Instruction:

Project Goals:

In this project, we propose to take a department-wide effort to transform the five information security related courses using no-cost-to-students learning material. This project not only aims to reduce the financial burden imposed by high cost of textbooks, but also strives to develop free and open-access learning materials that offer equivalent or better educational effectiveness than traditional textbooks. We also plan to develop online offerings of proposed courses that meet the internationally recognized Quality Matters (QM) standards.

Statement of Transformation:

1. The Transformation Description

According to Priceonomics (<http://priceonomics.com/which-major-has-the-most-expensive-textbooks/>) an average undergraduate student annually spends \$1,200 on textbooks. The price of textbooks is now leading students' course decisions (M. Parry, "Students Get Savvier About Textbook Buying," The Chronicle of Higher Education, 27-Jan-2013.). The cost of textbooks depends on the major, with computing textbooks being in the top most expensive, and, at the same time, having one of the smallest resale values (Priceonomics). This is more than true for textbooks in Cybersecurity. The content of Cybersecurity courses is constantly changing with various innovations, updates, and revisions needed to keep the information current. Textbook publishers cannot keep up with the fast-moving changes in Cybersecurity and the textbook price for Cybersecurity is very high.

Georgia was recently ranked 3rd in the nation for information security, home to more than 115 information security-related companies (Technology Association of Georgia). Furthermore, there is a significant shortage of trained cybersecurity professionals anticipated in Georgia (USG Cyber Education Committee, 2015). In 2014, Georgia had an estimated 8000 open positions in cybersecurity-related fields with additional shortfalls expected in future years (USG Board of Regents Meeting Minutes, 2015). USG does not produce enough graduates for Georgia's job market. One of the reasons is the cost of education including textbook costs.

The textbooks currently used in the five proposed security related IT courses are quite expensive. Some textbooks do not have the latest edition in the market available (e.g., IT 6833 textbook is from 2005) or, not frequently updated (IT 4843 is from 2011 with new edition just released at the end of 2016

http://www.cengage.com/search/productOverview.do?N=16+4294922389&Ntk=P_EPI&Ntt=15299614671691324142564844329453982650&Ntx=mode%2Bmatchallpartial). The goal of our transformation is to replace the textbook used in the proposed courses with no-cost-to-students learning materials that offer equal or higher educational effectiveness and can be easily updated more frequently.

Four out of six team members were part of the round two of an "Affordable Learning Textbook Transformation Grant" in 2015 (round two, award #119). They designed and evaluated the effectiveness of no-cost-to-students learning materials for database courses in IT department, and saved students \$110,419. The assessment results showed that the developed free material offered equivalent or better learning experience than the textbooks did. The preliminary results of the grant were published in the Proceedings of Southern Association for Information Systems Conference (SAIS 2016), the final results were published in the Proceedings of the ACM Special Interests Group in IT Education (SIGITE 2016), "Transforming IT Education with No-Cost Learning Materials". They also hosted a panel discussion on no-cost learning material in IT education, at SIGITE in October 2016. The panel attracted a lot of attention among computing faculty. Many colleagues from different states were impressed with the USG initiative and with course material developed by the team. Building on our past success and lessons learned from the prior ALG grant, we will continue our transformation efforts by developing no-cost learning material for five security related courses.

2. The Stakeholders of the Transformation

There are two primary sets of stakeholders for this proposal – the students taking the five security related IT classes (both in-class and online students), and the faculty developing and teaching those courses. The high cost of textbooks puts a large financial burden on students and may become a road block for students' ability to finish their education. Our team of investigators strives to make higher education more affordable to the students. The information security related learning materials are widely available on the World Wide Web today, and some of them have been created by our faculty members. Many of these resources are publicly accessible, free, or with an open license to use. These materials include open and free tutorials, books, videos, labs, software, and services. For example, the majority of the network protocol specifications are published as Request for Comments (RFC) by the Internet Engineering Task Force (IETF) and the Internet Society (ISOC), the principal technical development and standards-setting bodies for the Internet. Security protocols such as Wi-Fi Protected Access version 2 (WPA2) are part of the IEEE 802.X group of networking protocols and their specifications are freely available on the Internet. IT security courses include hands-on labs where software and tools get updated frequently and current set of textbooks are not at par with the rapid update. These textbooks (see table 2) contain links to tools or websites which may no longer be available or supported for students to access needed information. As soon as a new version of a tool or software package is released, the instructions in a textbook become obsolete. Therefore, we need to include the latest available tools to prepare hands-on labs.

Many of the textbooks become outdated as soon as they are published, while digital delivery of the learning materials makes it easier to keep the content up-to-date. Developing and assembling a set of learning materials for major security-related courses is a unique approach. It will allow us to better align the learning material not only with the outcomes of each course, but also with the outcomes of the Information Technology program.

Compared to traditional textbooks, the open source software and web resources have many benefits: 1) the Web resources are generally free to use; 2) they are constantly being updated and always reflect the latest trends and industrial development; and, 3) the materials from the Web are also more dynamic and interactive. The pitfalls of Web resources are that they are often disorganized and may contain inaccurate information. However, members of our team of investigators are not only subject matter experts in the information security field, but also proficient educators who on average have more than 10 years teaching experience. We will select, organize and integrate resources from the web and transform the information into instructionally sound learning materials for the proposed courses including content that the team members develop themselves. We strongly believe that the new learning materials will offer up-to-date, equivalent or better learning effectiveness compared to the original textbooks. Digital delivery also allows us to add interactive elements into the learning materials. The interactive content will not only engage the students, but also improve their learning experience. It will help to enhance the learning outcomes and learning satisfaction.

3. The Impact of the Transformation

The impact of our transformation efforts will be profound. By our estimates, more than 850 students will benefit from the no-cost learning material each year. Moreover, it has the potential to benefit more students when the proposed Bachelor of Science in Cybersecurity (eMajor) is approved by the Board of Regents.. The goal of eMajor is to reduce the cost of education by using prior learning assessments, lower tuition and potentially no-cost learning materials (<https://emajor.usg.edu>). The proposed project is expected to save current students \$117,843.60 in textbook costs each year (more if the eMajor is approved). Because of the cost savings from not having to buy textbooks, students may be able to take a few more courses each year and graduate sooner. Having a series of security courses adopting no-cost-to-student material not only offers better and more consistent learning experience to students, but also makes our nationally renowned IT programs more affordable. As a result, our IT programs could recruit more students and produce more qualified IT professionals that Georgia needs. Our experience gained in this transformation project could be useful to other programs or departments who want to lower the cost of education to their students. In summary, we believe the proposed project will have a positive impact in students' retention, progression, and graduation at program, department and institution levels.

(http://achievingthedream.org/press_release/15982/achieving-the-dream-launches-major-national-initiative-to-help-38-community-colleges-in-13-states-develop-new-degree-programs-using-open-educational-resources ,

http://affordablelearninggeorgia.org/documents/ALG_Flyer_Sept_2014.4.pdf.

Transformation Action Plan:

With a coordinated effort, our team of investigators plan the following activities to transform all information security related courses to completely use no-cost learning materials:

- * Research and identify no cost reading materials for each of the learning modules in each course. The reading list includes both required readings and optional readings. All of these readings will be publicly accessible, free to use, or openly licensed.
- * Research and identify no cost materials that can be shared across the courses.
- * Develop study guides and lecture notes for students' use to review course content and key learning points.
- * Adopt or develop content, assignments, exercises and lab materials that are no cost to students to replace the ones in the textbooks.
- * Develop test banks to replace the ones in the textbooks.
- * Adopt open source or no-cost-to-student lab ware for students to gain hands-on experience.
- * Update the syllabus to include major resources and no cost materials.
- * Re-develop the proposed courses in our learning management system, D2L Brightspace, following Quality Matters™ standards

The responsibilities of each investigator is described as follows.

Dr. Lei Li, IT 6833, Project lead; Subject matter expert, course developer and instructor of record of IT 6833.

Dr. Rebecca Rutherford, CSE 3801, subject matter expert, course developer and instructor of record for CSE 3801.

Dr. Svetlana Peltsverger, IT 6843, subject matter expert, course developer and instructor of record for IT 6843.

Dr. Hossain Shahriar, subject matter expert, course developer and instructor of record for IT 4843.

Prof. Dawn Tatum, IT 6883, subject matter expert, course developer and instructor of record for IT 6883.

Dr. Zhigang Li, Provide Instructional Design Support to all five proposed courses.

All course design with the no-cost materials will be provided through D2L Brightspace for our students and on the ALG website for the public access.

Quantitative & Qualitative Measures: The investigators plan to assess the effectiveness of our proposal in two ways - in the middle and at the end of the semester. Qualitatively, we will design a survey and gather inputs from the students after they use the no-cost learning material. Quantitatively, we will compare students' performance data gathered from sections using traditional textbooks and sections using no-cost learning material. The investigators will collect student performance data such as pass rates from the five proposed courses taught with a textbook by team members between fall 2015 and summer 2016. This data will be used as a baseline for comparison of student performance in courses with alternative no cost material. Our assessment plan can be summarized as follows.

1. Student performance measures. This data is from the overall class performance based on the grading of student works. Metrics include:
 - * Class average, grades distribution, pass rate for each grading item.
 - * Overall letter grades distribution, pass rate, withdraw rate, and fail rate.
 - * Percentage of students meeting or exceeding learning outcomes
2. Specific survey on no-cost learning materials. A web-based survey will be developed for all proposed courses and be distributed at the end of the semester to collect student feedback. It consists of a mixture of quantitative and qualitative measures including:
 - * Student perception and attitude toward no cost materials
 - * Quantitative ratings of the no cost materials used in this course
 - * Qualitative comments and suggestions
3. Student evaluation of the instructor. Formal student evaluation of the instructor can also provide information about teaching effectiveness using no cost materials. This evaluation is based on standardized forms for every course. For each of the measurement, the investigators are going to conduct two levels of analysis: 1) Comparing the achievement levels of the course learning

outcomes - generally, 75% is the aimed passing rate in undergraduate courses and 80% in graduate courses. 2) Comparing the achievement levels to those from past offerings where costly textbooks were used. The investigators will use the data from the sections taught in the past 2 years. In addition, Kennesaw State University requires all online courses to be reviewed and approved following an internal review process using Quality Matters (QM) standards. This review will ensure the no-cost learning materials used or developed for the cyber security courses are instructionally sound. The College of Computing and Software Engineering will also conduct subject matter expert reviews for all developed courses to ensure the quality of the learning materials.

Timeline:

Spring 2017

- * Collect baseline statistics on each course (course developers – those faculty who are in charge of the course for this study)
- * Course modules redesigned to use the no cost materials. These include all new content, readings, lecture notes, video clips, exercises, labs, and assignments. The changes are reflected in the learning module study guides. (completed by course developers)
- * Course level assessment and informational materials redesign. This includes quizzes, tests, and syllabus. (course developers and instructional designer)
- * Submit the developed courses for instructional design review through Quality Matters. (instructional designer and KSU Distance Learning Center office)
- * Submit the developed courses for subject matter expert review. (department Chair)

Summer 2017

- * Develop a survey on effectiveness of the no cost materials (all course developers and instructional designer)
- * Teach:
 - o IT 6833 - Wireless Security, Dr. Li
 - o IT 6883 - Infrastructure Defense, Prof. Tatum
- * Survey two summer courses and give student course evaluation (course developers and instructional designer)

Fall 2017

- * Teach:
 - o IT 4843 - Ethical Hacking for Effective Defense, Dr. Shahriar
 - o IT 6843 - Ethical Hacking: Network Security and Penetration Testing, Dr. Peltzberger
 - o CSE 3801 - Professional Practices and Ethics, Dr. Rutherford
- * Survey three fall courses and give student course evaluation (course developers and

instructional designer)

* Complete final assessment data analysis and prepare a final report (all course developers and instructional designer)

Budget:

The funding mainly compensates our team of investigator's work and activity beyond normal teaching load or other job responsibilities in order to successfully complete the project. For each proposed course, course developers approximately will spend at least 80 hours in developing the no-cost learning material and be the instructor of record, and, will spend 20 hours in course assessment. Instructional support will devote at a minimum 50 hours in assisting course developers. Thus, we request the budget of this project as follows.

Dr. Lei Li, Project lead; course developer and instructor of record of IT 6833, \$5,000

Dr. Rebecca Rutherford, course developer and instructor of record for CSE 3801, \$5,000

Dr. Svetlana Peltsverger, course developer and instructor of record for IT 6843, \$5,000

Dr. Hossain Shahriar, course developer and instructor of record for IT 4843, \$5,000

Prof. Dawn Tatum, subject matter expert, course developer and instructor of record for IT 6883, \$5000

Dr. Zhigang Li, Provide Instructional Design Support to all five proposed courses, \$3,000

Travel: \$2,000, for project team members to attend the ALG kickoff and subsequent meetings to bring back information to the team members. Our project team is also planning to submit a paper to reputable IT education conferences such as ACM SIGITE 2017 (Special Interest Group in IT Education).

Total Budget: \$30,000

Only open source software or free software will be used in this project thus there is no additional spending on software or equipment purchasing.

Sustainability Plan:

The IT department implemented a course developer system for all courses. A course developer updates course content based on research, publications and feedback from students and alumni. Each of investigators except the instructional designer is a course developer for corresponding course. A course developer creates and maintains the course materials and teaching plans. He/she also teaches the course at least once a year to make sure all resources are valid and makes necessary changes and updates. This makes sure all no-cost materials and resources are highly sustainable in the future offerings of this course.



August 30, 2016

ALG Grant Committee
University System of GA

Dear Colleagues:

This letter is in support of the Proposal “Transformation at scale: Developing No-Cost-to-Student Information Technology Security Related Courses” submitted from Kennesaw State University, Information Technology department faculty. As Department Chair for Information Technology, I clearly see the need for bringing down costs for our students. The ALG grants assist faculty to prepare no-cost courses that allow students to take courses without the monetary burden of expensive textbooks.

Several faculty in the Information Technology Department at Kennesaw State University have successfully carried out one ALG grant for database courses in the curriculum. The current proposal addresses security related courses in the IT curriculum. The savings already realized from the previous ALG grant encouraged our faculty to develop this new ALG grant proposal to help our students save even more money.

I strongly support this proposal. This is a very sustainable proposal as we have a large Information Technology degree program. Many of our students take courses online as well as in-class. Creating the no-cost for textbook version of our security courses will allow students for many years to realize savings from not buying textbooks for both database and security courses.

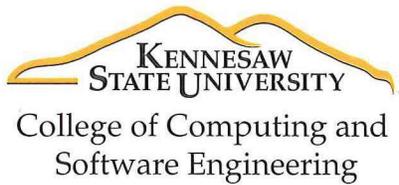
This is a very solid proposal. All faculty participating in the first ALG grant completed their courses and offered them successfully. Papers for two conferences about the grant have been created and presented (one this end of September). I believe that this new ALG proposal will have the same student satisfaction and success that the first ALG grant did. This new proposal will have an even larger monetary impact on our students than the first grant. Thank you for your consideration for this proposal.

Sincerely,

Rebecca H. Rutherford, Ed.D.

Interim Assistant Dean of the College of Computing & Software Engineering, Department

Chair for Information Technology, Professor of Information Technology
brutherf@kennesaw.edu



December 8, 2016

Dear Affordable Learning Georgia (ALG) Grant Reviewers,

It is my pleasure to write this letter in support of the proposal, “Transformation at scale: Developing No-Cost-to-Student Information Technology Security Related Courses”, submitted by Dr. Li, Dr. Shahriar, Dr. Rutherford, Dr. Peltsverger, Dr. Li, and Ms. Tatum from our Information Technology (IT) Department at Kennesaw State University.

In this project, the primary investigators will work as a team to replace existing, costly textbooks in five information security related courses with no-cost-to-students learning materials. Their efforts will significantly lower the cost of education for students (saving over \$100k per year at KSU alone) and generate a positive impact on the retention, progression, and graduation for the College of Computing and Software Engineering. Additionally, given the rapid change of the IT field, having digital materials available to students will improve the ability to keep them updated with the latest advances in the field of information security.

Four of the proposers have past experience with a successful ALG project, thus the quality and success of this new project is highly likely. The investigators in this project are also designated course architects who are responsible for the development and the maintenance of the to-be-transformed courses. The no-cost-to-students materials developed will be distributed using the course management system, GeorgiaView Desire2Learn. Thus, I believe the effort of this project will be sustainable over the long term and benefit students throughout Georgia.

In conclusion, I wholeheartedly support this effort. This proposal has the full support of the College of Computing and Software Engineering.

Sincerely,

Dr. Jon A. Preston
Interim Dean
College of Computing and Software Engineering
Kennesaw State University

From: [Tamara Powell](#)
To: [Rachel Myers](#); [Seneca Vaught](#); [Griselda Thomas](#); [John L. Isenhour](#); [John L. Isenhour](#); [Ophelia Santos](#); [Charles Marvil](#); [Shangrong Deng](#); [Laura Ritter](#); [Guangzhi Zheng](#); [Zhigang Li](#); [Lei Li](#); [Rebecca Rutherford](#); [Svetlana Peltsverger](#); [Zhigang Li](#); [Nancy Colyar](#); [Ginny Zhan](#); [May H. Gao](#); [Yumin Ao](#); [Carlton Usher](#); [Linda Lyons](#); [Daniel Farr](#); [Tiffani Reardon](#); [Jonathan Arnett](#); [Monique Logan](#); [Cassandra Race](#); [Sharon Pearcey](#); [Chris K. Randall](#); [Jennifer Willard](#); [Beth Kirsner](#); [Adrienne Williamson](#); [Tricia Mahaffey](#); [Chi Zhang](#)
Cc: [Rita Spisak](#); [Elke Leeds](#)
Subject: Hello Textbook Transformation Grant Winners! We Would Like to Honor You!
Date: Wednesday, March 2, 2016 1:04:24 PM
Attachments: [KSU Library System Authors Request for Items.docx](#)

Hello Textbook Transformation Grant Winners!

You are receiving this email because you have dedicated your time and expertise to reducing the student debt load at KSU. Please see your names and accomplishments listed below. In total, you have reduced at least \$1,048,545 from the KSU student debt load each year. Please see the attached and submit your information for the SPSU L.V. Johnson Library Annual Authors Reception. And please let me know if there are any corrections or changes to the information below, as I would like to write up an article celebrating this incredible achievement. Thank you for all your hard work. Tammy

Camille Payne and Rachel Myers (Nursing) student savings, \$30,468
Seneca Vaught and Griselda Thomas (AADS) \$20,840
John Isenhour, Ophelia Santos, Charles Marvil (Culinary Studies) \$13,875
Lake Ritter, Shangrong Deng (Math) \$157,865
Guangzhi Zheng and Zhigang Li (Information Technology) \$16,833
Lu Kang and Zhigang Li (Chemistry) \$184,320
Lei Li, Rebecca Rutherford, Svetlana Peltsverger, Jack Zheng, Zhigang Li, Nancy Colyar (Computer Science/IT) \$110,419
Ginny Zhan, May Gao, Yumin Ao (Asian Studies) \$11,249
Carlton Usher and Linda Lyons (First Year Studies) \$67,250
Daniel Farr and Tiffani Reardon (Sociology) \$13,963.80
Tamara Powell, Jonathan Arnett, Monique Logan, Cassandra Race, Tiffani Reardon (DWMA/English) \$51,615
Sharon Pearcey, Chris Randall, Jen Willard, Beth Kirsner, Adrienne Williamson, Tricia Mahaffey (Psychology) \$345,912
Chi Zhang and Bob Brown (Information Technology) \$23,936

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"My job is not to prop the door of opportunity open. It is to take that door off its hinges once and for all."
Former Massachusetts Lt. Gov. Evelyn Murphy

Dr. Tamara Powell
Director of Distance Education, College of Humanities and Social Sciences
Associate Professor of English
Kennesaw State University
CHSS Dean's Suite, 42 Bartow Avenue NW
MD 2201 Bldg. 22 Rm 5008
Kennesaw, GA 30144-5591
470-578-2911

Syllabus

IT 6833 Wireless Security Course Syllabus Summer 2017

Instructor

Dr. Lei Li, Associate Professor

E-mail: lli@kennesaw.edu

Office Phone: 470-578-3915

Office Location: Atrium Building J364

Office Hours: Wednesday 2pm -4:50pm, Thursday 4pm -4:50pm, and by appointment

Virtual Office Hours: Email/Text message, or online chat, contact instructor to make an appointment.

Course Communication

Effective communication is the key to the success of online classes. Please use following guideline for class communication.

- **Email me or text me** (706-225-9219, don't call this number unless it's emergency). Use D2L email if possible. My KSU email (lli13@kennesaw.edu) should only be used when you don't have access to D2L site. Your emails and texts are **GUARANTEED** to be replied **WITHIN 12 HOURS**.
- When email me using accounts other than D2L email, put the course and section number in the subject line. Emails without proper subject line will not be replied.
- Avoid using personal email to contact me. Sensitive information (such as your grades) can **ONLY** be sent to D2L email or KSU email account.

Course Description

Classroom & Meeting time:

IT 6833/W01 (CRN 51633). 100% Online.

Required Textbook

No textbook is required. Learning material will be provided through D2L course website.

Prerequisites: IT-6823

Description: This course covers methods and techniques to secure wireless networks against threats and attacks. Topics include:

- Security and Cryptography
- Network Security Protocols
- Security and Layered Architecture
- Voice-Oriented Wireless Networks
- Data-Oriented Wireless Networks
- Security in Traditional Wireless Networks
- Security in Wireless LAN
- Security in Wireless Ad Hoc Network

Special Topic: Mobile Security

Learning Outcomes

By the end of this course, you should be able to:

- Describe the differences between wireless security and wired security

- Build the working knowledge of security building blocks so that it can be applied to solve the problems of designing security solutions in wireless network systems
- Acquire the fundamental understanding of two main-stream approaches (i.e., data-oriented and voice-oriented) taken by wireless security systems
- Master to learn at least one of advanced wireless network security systems in depth, and enhance the skills of enabling and configuring a wireless network system
- Describe the pros and the cons of at least one emerging system (IT-6833 only)

Technical Requirements

- This class uses D2L Brightspace as hosting site. Run a [system check](#) to ensure your computer work with D2L. Check out D2L student support site for instructions: <https://kennesaw.view.usg.edu/>
- Internet Connection. A high speed Internet connection such as DSL or cable Internet access is highly recommended. You can also use computer labs on campus to complete the coursework.

Course Organization

For the online section and there is no scheduled face-to-face meetings. For the hybrid section, we meet once a week. Regardless the format of class, the content of this course is organized by weekly modules. Each weekly module starts on Monday and ends on Sunday. The weekly module will be available to students one week ahead of the time. A weekly unit usually includes followings items.

1. A study guide - an overview of what are covered, learning objectives and a to-do-list.
2. Assigned readings from the textbook and supplemental material such as PowerPoint slides;
3. Information of due items such as quizzes, discussions and projects. All items are usually due on Sunday 11:59pm. And the due date may change during the course of the semester. Always refer to course calendar in the D2L course site for accurate due date.
4. There might be different requirements for students in online session and hybrid session. The requirement will be clearly stated in the study guide and description of the grading items.

Grading

Items	Percentage
Assignments & labs	42%
Quizzes and Discussions	12%
Midterm Exam	18%
Final Exam	18%
Team Project	10%
Total	100%

Grade Conversion: A: (90-100), B: (80-89), C: (70-79), D: (60-69), F: (0-59)

Grade Indicator: this is a special grading item in the grade book. It summarizes your overall grade up to date. The indicator will be updated after each major assignment/exam grade release. Always be aware of your grade indicator.

Quizzes, Projects & Exams Policy

- All projects **MUST** be submitted through D2L Brightspace (<http://kennesaw.view.usg.edu/>) course website by the deadline. Email submission will **NOT** be accepted. Any assignment that is less than 24 hours late is subject to 10% penalty. Any assignment that is more than 24 hours late will **NOT** be accepted.
- All quizzes and exams **MUST** be completed on D2L website by the deadline. The quizzes exams can't be opened/submitted after the deadline.
- Team projects – students will work in groups (3 or 4 person per group) on a series of projects

throughout the semester.

- If you must miss an exam due to illness, you must e-mail or call me *before* the scheduled time. Failure to notify the instructor prior to the scheduled time will produce an automatic zero for the exam. **NO makeup test except for emergencies with proof (e.g. doctor's slip)**

Course Schedules

Below is an outline of the content and activities in each module of the course. Course schedule is tentative and subject to change.

Week	Date	Course Contents	Notes
1	5/30 – 6/4	LM0- Course Orientation LM1 - Security and Cryptography	Course Introduction
2	6/5 – 6/11	LM2 - Network Security Protocols LM3 –Security and Layered Architecture	Assignment 1
3	6/12 – 6/18	LM4 - Voice-Oriented Wireless Networks LM5 - Data-Oriented Wireless Networks	Assignment 2
4	6/19 – 6/25	Midterm Exam (Chapter 1-5)	Android Lab 1
5	6/26 – 7/2	LM 6 - Security in Traditional Wireless Networks 6/26 - Last Day to Withdraw Without Academic Penalty	Team project report 1 Android Lab 2
6	7/3 – 7/9	LM7 – Chapter 7: Security in Wireless LAN	Android Lab 3
7	7/10 – 7/16	LM8 - Special Topic: Mobile Security	Team Project final report
8	7/17 – 7/23	7/21 – Last day of class Final Exam: time to be announced	

Course Expectation

Student Responsibility

For this online class, you should expect to spend seven to eight hours each week on coursework:

- Check KSU email regularly;
- Login D2L brightspace course website frequently to access the course material (at least every other day);
- Follow the weekly study guide in the learning module;
- Study the assigned material such as virtual lectures, textbook chapters and the PowerPoint slides;
- Complete assigned quiz/assignment/discussion/project on time.

Tips for Effective Online Learning

For an online class, students can really enjoy the benefits of learning at you own pace and at the place of your choice. Below are some tips for effective online learning. Those tips are beneficial to students enrolled in on campus section as well.

- **Check D2L Brightspace course website frequently.** It's recommended that students should login D2L course site **AT LEAST** every other day. Always be aware of current status of the course. Take advantage of the posted learning material such as recorded lectures.
- **Work with the instructor closely.** If you have any question, contact the instructor immediately. You can either email or text me and your message is guaranteed to be replied within 12 hours.

- **Start your work early.** If you can start a task early, don't start late. Assuming you spend the same amount of time completing the task, starting later will be much more stressful than starting early. Never start until the last minute! You'll have no turnaround time if you need help or something happens.
- **Keep up with the work.** Don't fall behind. If you do, contact the instructor immediately for what you need to do. The instructor may also contact you if he is concerned. Respond to the instructor's inquiry promptly.

Communication Rules

In any classroom setting there are communication rules in place that encourage students to respect others and their opinions. In an online environment the do's and don'ts of online communication are referred to as **Netiquette**. As a student in my course you should:

- Be sensitive and reflective to what others are saying.
- **Avoid typing in all capitals** because it is difficult to read and is considered the electronic version of 'shouting'.
- Don't flame - These are outbursts of extreme emotion or opinion.
- Think before you hit the post (enter/reply) button. You can't take it back! Don't use offensive language.
- Use clear subject lines.
- Don't use abbreviations or acronyms unless the entire class knows them. Be forgiving. Anyone can make a mistake.
- Keep the dialog collegial and professional, humor is difficult to convey in an online environment.
- Always **assume good intent** and **respond accordingly**. If you are unsure of or annoyed by a message, wait 24 hours before responding.

Policies

Attendance Policy

Attendance and participation in class are expected. If you have any problems with attendance (or something else), contact me **BEFORE** they become a problem.

The instructor is required to file an engagement report by **[date to be determined]**. Students who never login D2L course web site or only complete little to none course work will be considered as **“NOT ENGAGED STUDENT”**. Instructor will send an email to those students for verification before file the report. Not engaged students will be **DROPPED** from the class

Academic Honesty

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an “informal” resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also <http://www.kennesaw.edu/scai/content/ksu-student-code-conduct>.

Students are encouraged to study together and to work together on class assignments and lab exercises; however, the provisions of the STUDENT CONDUCT REGULATIONS, II. Academic Honesty, KSC Undergraduate Catalog will be strictly enforced in this class. Examples of cooperation are **OK**: talking with someone about approaches to the assignment, discussing a particular problem that you are having.

- Examples of cooperation are **NOT OK**: taking someone else's assignment and modifying it, examining someone else's solution in detail.
- Any cases involving suspected academic dishonesty result in a grade of **ZERO** for the assignment. This penalty applies to all students involved.

Committing plagiarism is considered an act of academic dishonesty and will be taken very seriously. Any instances where academic dishonesty is suspected will result in an automatic grade of a zero for all students involved. Further disciplinary action may be taken such as suspension or expulsion from the University.

Grade Appeals and Student Complaints

KSU desires to resolve student grievances, complaints and concerns in an expeditious, fair and amicable manner. For complaints regarding this course, please contact the professor. If the issue is not resolved, contact the department chair.

Withdrawal Policy:

The last day to withdraw without academic penalty Wednesday 3/1/2017. Ceasing to attend class or oral notice thereof DOES NOT constitute official withdrawal from the course. Students who simply stop attending classes without officially withdrawing usually are assigned failing grades. Students wishing to withdraw after the scheduled change period (add/drop) must obtain and complete a withdrawal form from the Academic Services Department in the Registrar's Office.

Enrollment Policy:

Only those students who are enrolled in the class may attend lectures, receive assignments, take quizzes and exams, and receive a grade in the class. If a student is administratively withdrawn from this course, they will not be permitted to attend class nor will they receive any grade for the class.

Electronic Devices:

In order to minimize the level of distraction, all beepers and cellular phones must be on quiet mode during class meeting times. Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students. Recording of lectures by any method requires prior approval of the instructor. Students using a laptop in class should not check their email, browse the web, or in other way detract from the focus of the class.

Reasonable Accommodations

Students with qualifying disabilities under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act who require "reasonable accommodation(s)" to complete the course may request those from Office of Student Disability Services. Students requiring such accommodations are required to work with the University's Office of Student Disability Services not individual faculty members or academic departments. A student anticipating a need for accommodation, must submit documentation requesting an accommodation in a timely fashion to permit time for a determination prior to submitting assignments or taking course quizzes or exams. Students may not request retroactive accommodation. Students should contact the office as soon as possible in the term for which they are seeking accommodations. Student Disability Services is located in the Carmichael Student Center in Suite 267. For more information, please call 470-578-2666 or visit the Student Disabilities Services websites at

www.kennesaw.edu/stu_dev/sds

http://www.kennesaw.edu/stu_dev/dsss/dsss.html

Student Privacy (FERPA)

Students have certain rights to privacy. <http://registrar.kennesaw.edu/resources/ferpa.php>

The University's online learning system and email system are designed to prevent unauthorized individuals from gaining access to sensitive information or information protected by federal or state law. We will communicate regarding course matters through the University's designated technology learning system or Kennesaw state email system.

KSU Sexual Misconduct Policy & Ethics Statement

KSU will not tolerate sexual misconduct or sexually exploitative or harassing behavior of any kind.

<https://policy.kennesaw.edu/content/sexual-misconduct-policy>.

You are expected to respect religious, cultural, and gender differences.

Classroom Behavior:

Students are reminded to conduct themselves in accordance with the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Every KSU student is responsible for upholding the provision. Students who are in violation of KSU policy will be asked to leave the classroom and may be subject to disciplinary action by the University.

Reference Requirement

When you quote or base your ideas on other people's work (e.g., from articles, journals, magazines, books, websites, etc.) in assignments or discussions, you **MUST** cite the source you used. When you direct quote, you must put others' words in quotation marks and cite the source(s). When reading that source contributed to the ideas presented in your paper, you must give the authors proper credit.

Students are recommended to use APA style for their references.

- APA style guide: <http://owl.english.purdue.edu/owl/resource/560/01/>

Student Course Evaluation:

A standard questionnaire (described below) will be administered during the last two weeks of the semester in all classes. Additional questions developed by the college or instructor(s) may be included as well. It is important that each student provide meaningful feedback to the instructor(s) so that changes can be made in the course to continually improve its effectiveness. We value student feedback about the course, our teaching styles, and course materials, so as to improve our teaching and your learning. At a minimum, the following two questions will be asked: 1) Identify the aspects of the course that most contributed to your learning (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring), and 2) Identify the aspects of the course, if any, that might be improved (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring).

Help Resources

Library

The KSU Library System assists all students, faculty and staff with their research, including using library databases to find articles, accessing books and other materials in our catalog, and for specialized research needs. Librarians are available for in-person walk-up assistance at library help desks, one-on-one research appointments, and 24x7 via library chat. For more information on library locations, hours, and how to access our services please visit <http://library.kennesaw.edu/>

Student Email and Web Account Access:

KSU uses a central authentication server that will allow one username and password to be used by all KSU users to access an increasing variety of applications (email, WebCT etc.) This unified network identification is referred to as your "NetID". The source for university-provided email and web space for

students is located at <http://students.kennesaw.edu>. Students have access to this system once they have established their NetID. This system will provide email service through a web based interface.

How to Activate your NetID:

To activate your NetID go to <http://netid.kennesaw.edu> and click on the "Sign up Now!" link. You will be asked to provide information to verify your identity and set your password. This password will only be for NetID enabled applications.

How to Look Up a NetID:

After you have activated your NetID, you can look up other users by logging into <http://netid.kennesaw.edu> and clicking on Directory Search.

How to Send Email:

Your NetID in combination with the new email address would look like netid@students.kennesaw.edu.

Web Address:

For student web address, your NETID in combination with the new server address would look like <http://students.kennesaw.edu/~netid>. If you have problems please call the Service Desk at ext. 6999 or e-mail service@kennesaw.edu.

Owl Printing System:

The Owl Print system (student network printing/copying solution) is in place in the KSU library as well as all the open labs and lab/electronic classroom combinations across campus. Students must have an Owl Print card to use printing/copying services.

Other Student Resources

For issues with technical difficulties, please contact the **Student Helpdesk:**

- Email: studenthelpdesk@kennesaw.edu
- Call: 470-578-3555

*** Additional Technology Resources**

- [Student Service Desk and Help Center](#)
- [Browser Checker](#)
- [USG Desire2Learn Help Center](#)
- [ITS Documentation Center](#)
- [Check Service Outages](#)
- [Maintenance Schedule](#)

*** Academic Resources**

- [Academic Tutoring Services](#)
- [Disability Resources](#)
- [ESL Study and Tutorial Center](#)
- [Library](#)
- [The Writing Center](#)

*** Student Support and Wellness Resources**

- [Career Services Center](#)

[Counseling and Psychological Services](#)

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Final Report

Instructions:

A. *Your final report submission must include four separate component files:*

1. *Completed report form. Please complete per inline instructions. The italicized text is provided for your assistance; please delete the italicized text before submitting your report.*
2. *Course Outline document with links to the materials as used per day, week, or unit, organized chronologically. [View Course Outline Example](#)*
 - a. *For each resource, give the title, author, Creative Commons licenses (if appropriate), and freely accessible URL to the material. Include all open-access links to all adopted, adapted, and newly created course materials.*
3. *Supporting data on the impact of your Textbook Transformation (survey, analyzed data collected, etc.)*
4. *A photograph of your team and/or your students for use in ALG website and materials.*
 - a. *Photograph must be 800x600 pixels at minimum (length x height).*
 - b. *Photograph must be taken together: individual team member photographs and website headshots not accepted.*

B. Go to http://affordablelearninggeorgia.org/site/final_report_submission to submit these four components of your final report. Follow the instructions on the webpage for uploading your documents. You will receive a confirmation email. Based on receipt of this report, ALG will process the final payment for your grant. ALG may follow up with additional questions or to request your participation in a publication, presentation, or other event.

Date: 12/12/2017

Grant Number: 302

Institution Name(s): Kennesaw State University

Team Members (Name, Title, Department, Institutions if different, and email address for each):

- Lei Li, Professor of Information Technology, Department of Information Technology, li_lei@kennesaw.edu
- Zhigang Li, Instructional Technology Specialist & Part-Time Assistant Professor of Information Technology, Distance Learning Center, zli8@kennesaw.edu
- Hossain Shahriar, Assistant Professor of Information Technology, Department of Information Technology, hshahria@kennesaw.edu

- Rebecca Rutherford, Interim Assistant Dean of the College of Computing and Software Engineering, Chair of the Department of Information technology, and Professor of Information Technology, Department of Information Technology, brutherf@kennesaw.edu
- Svetlana Peltsverger, Interim Associate Dean in the College of Computing and Software Engineering and Professor of Information Technology, Department of Information Technology, speltsve@kennesaw.edu
- Dawn Tatum, Lecturer of Information Technology, Department of Information Technology, dtatum7@kennesaw.edu

Project Lead: Dr. Lei Li

Course Name(s) and Course Numbers:

- IT 4843 - Ethical Hacking for Effective Defense – Offered twice a year in summer & fall semesters.
- IT 6843 - Ethical Hacking: Network Security and Penetration Testing – Offered twice a year in summer & fall semesters.
- IT 6833 - Wireless Security– Offered once a year in spring semester.
- IT 6883 - Infrastructure Defense – Offered once a year in fall semester.
- CSE 3801 - Professional Practices and Ethics– Offered three times a year in spring, summer & fall semesters with multiple sections each semester.

Semester Project Began: Spring 2017

Semester(s) of Implementation: Fall 2017

Average Number of Students Per Course Section:

Number of Course Sections Affected by Implementation:

Total Number of Students Affected by Implementation:

Course	Number of sections	Students in each section	Total Students Affected
IT4843	2	32, 26	58
IT6843	2	7, 17	24
IT6833	2	13, 30	43
IT6883	2	6,20	26
CSE3801	5	48,46,36,35, 63	228
Total	9		379

1. Narrative

A. Describe the key outcomes, whether positive, negative, or interesting, of your project.

Our transformation effort is very successful. In this project, we have transformed five courses using no-cost-to-student learning material. Nine sections and total number of 379

students have been impacted. Students' opinions on Learning material we created are overwhelmingly positive. Our assessment data shows that, in majority of the section where the no-cost learning material were implemented, students' performance is either neutral or better comparing to students' performance in previously taught sections using textbooks.

From the instructors' perspectives, collecting and organizing the learning material ourselves not only enable us to better respond to dynamic nature of the information technology field, but also give us the flexibility to customize the course content to better serve our students. On the other side of the coin, the transformation activities require significant efforts and time commitment from the faculty to collect, organize, create, and maintain no-cost learning material that offers equivalent learning experience as the textbooks. Our transformative efforts in replacing textbooks in the proposed courses will not happen without the strong supports from ALG grant.

With our sustainability plan, the no-cost learning material will be continually used and hundreds and thousands of students from Kennesaw State University will enjoy the cost savings and enhanced learning experience in the future.

B. Describe lessons learned, including any things you would do differently next time.

Below are the lessons learned from the members of our project team.

Dr. Hossain Shahriar on IT 4843. The software tools keep changing fast, for example, Wireshark got its latest version recently. Lesson learned is to keep checking on tools for update and revise instructions and screenshots accordingly.

Dr. Svetlana Peltsverger on IT 6843. Some sources I used in class were not available when modules were covered. Most of them were YouTube videos that demonstrated latest attacks. The videos were removed by YouTube. The lesson learned is to use only reputable YouTube channels.

Dr. Becky Rutherford on CSE3801. This is the type of course that lends itself well for no textbook. The contents will need to be updated to be sure current issues and ethical links are included for the course.

2. Quotes

Provide three quotes from students evaluating their experience with the no-cost learning materials.

1. *"The presented readings combined with the learning modules was almost always enough for me to gain a solid grasp of the current topic. Whenever more materials were required, the information in the module was at least enough to help me seek out the additional free materials I needed for myself."* -IT6843
2. *"Since we are Information Technology majors, and our assignments are all about technology, textbooks are largely useless. Even in classes that do require textbooks, I never buy them"*

because there are so many resources online. It's nice to have sources listed within the course to use in conjunction with what I find on my own. " - IT4843

3. *"I thought this method was far more organized and more readable than an ordinary textbook."* - CSE3801

3. Quantitative and Qualitative Measures

3a. Overall Measurements

Student Opinion of Materials

Was the overall student opinion about the materials used in the course positive, neutral, or negative?

The overall student opinion about the materials used in the courses is overwhelmingly positive.

Total number of students affected in this project: 379

- Positive: 87.91 % of 91 number of respondents
- Neutral: 5.49 % of 91 number of respondents
- Negative: 6.60 % of 91 number of respondents

Student Learning Outcomes and Grades

Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?

We have 5 courses in this project. In term of learning outcomes and grades comparing to previous semesters, three courses are neutral, one course is positive and one course is negative. Overall student performance outcome is neutral comparing to previous semester.

Student outcomes should be described in detail in Section 3b.

Course	Student Performance outcome comparing to previous semester
IT4843	Neutral
IT6843	Negative
IT6833	Neutral
IT6883	Neutral
CSE3801	Positive

Choose One:

- Positive: Higher performance outcomes measured over previous semester(s)
- Neutral: Same performance outcomes over previous semester(s)
- Negative: Lower performance outcomes over previous semester(s)

Student Drop/Fail/Withdraw (DFW) Rates

Was the overall comparative impact on Drop/Fail/Withdraw (DFW) rates in the semester(s) of implementation over previous semesters positive, neutral, or negative?

We have 5 courses in this project. The DFW rates of IT 4843 and CSE 3801 are reduced. The DFW rates of IT 6843 and IT 6833 are slightly increased. Overall, the DFW rates for our project is neutral.

	Drop/Fail/Withdraw Rate:	
Course	Previous semester	Implementation semester
IT4843	2/23=8.6%	1/26= 3.8%
IT6843	4/35=11%	4/24=17%
IT6833	1/31= 3%	2/43 =4.6%
IT6883*		
CSE3801	6/41=15%	6/48=13%

Note: 1) the passing grade for student is B (80%); 2) the DFW rate for IT 6883 isn't available.

Drop/Fail/Withdraw Rate:

___9.22___% of students, out of a total ___141___ students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:

- ___ Positive: This is a lower percentage of students with D/F/W than previous semester(s)
- X Neutral: This is the same percentage of students with D/F/W than previous semester(s)
- ___ Negative: This is a higher percentage of students with D/F/W than previous semester(s)

3b. Narrative

- *In this section, summarize the supporting impact data that you are submitting, including all quantitative and qualitative measures of impact on student success and experience. Include all measures as described in your proposal, along with any measures developed after the proposal submission.*

In project, we proposed to use multiple channels of data to measure the success of our transformative efforts.

Quantitatively, we compared students' DFW rates, grades, and success in learning objectives. The DFW rates are taken from student registration system. The student grades and success in learning objectives are assessed Faculty Course Assessment Report (FCAR). Faculty in IT department at Kennesaw State University are required to create a FCAR for every course they teach for each semester. The FCAR includes students' grade and success in achieving the learning outcomes.

Qualitatively, we developed a survey to collect students' opinion on the learning material used in the courses. Students rated their experience using a 5 points scale. Students also give the opportunities to enter comments they may have. A copy of survey result is attached separately.

Based on the assessment data we collected, the learning material we created offer the same level of the learning effectiveness as the textbook. Students' performance outcomes and DFW in generally stay the same pre-implementation and post-implementation.

4. Sustainability Plan

The IT department at KSU implemented a course architect system for all courses. A course architect updates course content based on research, publications and feedback from students and alumni. Each of instructor of record is a course architecture for corresponding courses. A course architect develops and maintains the course materials and teaching plans. He/she also teaches the course at least once a year to make sure all resources are valid and make necessary changes. This makes sure all no-cost materials and resources are highly sustainable in the future offerings of this course.

5. Future Plans

- *Describe any impacts or influences this project has had on your thinking about or selection of learning materials in this and other courses that you will teach in the future.*
- *Describe any planned or actual papers, presentations, publications, or other professional activities that you expect to produce that reflect your work on this project.*

Information technology is dynamic field where existing technology frequently get updated and new technology constantly comes out. Due to this reason, the no-cost learning material model naturally fits better for IT curriculum than the traditional textbook models. The faculty in the IT department already completed several individual ALG project and two transform-at-scale grants. The positive feedback from the students and our own development and implementation process inspire more faculty in the IT to get involved with developing no cost learning material for their courses.

We shared our experience from this project in the 14th Annual Open Education Conference in Anaheim CA. Two of our team members, Dr. Rutherford and Prof. Tatum hosted a panel discussion on open source learning material in this conference in October 2017. The responses we received from the panel discussion are very positive.

6. Description of Photograph



Left to right: Dr. Rutherford, instructor of record; Dr. Li, team lead and instructor of record; and Dr. Peltserger, instructor of record.