Introduction to STEM Pathways and Careers

Overview Introduction to STEM Pathways and Careers was developed for the Louisiana Department of Education through a partnership between Louisiana State University and the East Baton Rouge Parish School System, with partial funding from the National Science Foundation. The course is available to middle school students at the seventh or eighth grade level for high school credit and serves as a basic career readiness course on all Jumpstart 2.0 Pathways including the STEM Pathways. This year long project-based course explores four main pathways of STEM education and possible careers in the fields of 1) Computing and Computer Science, 2) Pre-Engineering, 3) Digital Design and Emergent Media, and 4) Biomedical Sciences. This course is meant to expose students to these overarching concepts:

- To expand awareness of various careers and occupational pathways related to STEM
- To stimulate the understanding of higher order thinking processes such as the engineering design process, the scientific method, and computational thinking.
- To develop foundational knowledge and skills in the JumpStart pathways and careers as related to STEM and utilize the knowledge and skills in their current educational setting.
- To increase interest in the four core areas of STEM related to this class through project-based activities that are also standards based.

Objectives

- Identify career opportunities in various STEM fields.
- Use computing technology for creative expression.
- Explain the Software Development Process through projects and activities where students design and code.
- Explain the Engineering Design Process and utilize the process in various engineering projects.
- Describe the role of visual communication and its cultural implications in society.
- Use various forms of digital and emergent media to design their own products.
- Explore and analyze medical scenarios in the areas of forensics, comparative anatomy, ecology studies, biochemistry, microbiology, and bioinformatics.

Assessment Students will be assessed using projects throughout the class, exams, and daily/ weekly assignments.

Course Essentials

Equipment	Cost/Unit
Software	$0 (Required) or up to $500 for paid premium software that has more options.
Computer or laptop	
Other Materials	Reusable: $1500 Consumable: (up to $500 per year, replace as needed)

First Semester Course Outline

Unit 1: Introduction to Pre-Engineering	Engineering design process, Careers, Ethics, Professionalism, Circuits, Robotics, Build an Arduino Robot, Build a Better Mousetrap Car
Unit 2: Digital Design and Emergent Media	What is DDEM, Careers, Design Principles, Website Creation, Digital Portfolios, Web Design, Digital Animation, 3D Design, Graphic Design for a Business, Digital Storytelling.

Second Semester Course Outline

Unit 3: Introduction to Computer Science and Computational Thinking	Why Computing, Algorithms and Sequencing, Debugging, Intro to Scratch, Event Programming, Sprite Conversations, Broadcasting Events, Conditional Events, Data Storage, Variables and Conditionals, Making a Quiz, Reverse Engineering, Hackathon, Intro to HTML Additional lessons available in Variables in Computer Programs and Math, Inputs and Drawing, Custom Events and Game Design, Complex Conditionals with Operators and Nested Conditionals, Input Variables and If-Then-Else Conditionals, Decomposition and Adding to Decomposed Code in a Game and Project of Choice, Initialization Explored and Created.
Unit 4: Biomedical Sciences	What are Biomedical Sciences, Careers, The Scientific Method, Forensics and Comparative Anatomy, Ecology and Coastal Studies, Biochemistry and Microbiology, Bioinformatics.
Career interest embedded in each unit	Self- Assessment, STEM Careers- duties and responsibilities, educational training, and the use of new STEM technologies and their impact on the jobscape are explored. Students will reflect on their personal strengths to select a career. The students will then research the path to get to their desired job.

INTRODUCTION TO STEM PATHWAYS AND CAREERS

1. Materials

   Internet access, one-to-one computer use daily, and access to the LSU servers. Chromebooks will not work with the free Arduino software.

Reusable Hardware/Material	Recommended Unit	Cost/Unit
Various reusable material and hardware for projects	1 per classroom	$1,500
Consumables		
Various consumables for projects	1 per classroom	$500
Software		
Arduino IDE	1 per computer	Free on computer, $1/ month for chromebook

*Complete supply list can be found here.

2. Required software, networking access, and access to LSU servers
   - Students will need to sign up with online development and testing environments, including but not limited to codesandbox.io, jsfiddle.net, scratch.mit.edu and others.
   - Students will need access to YouTube instructional videos relevant to the course, as well as other educational video repositories.
   - Teachers will need to be able to access the LSU servers using several Internet protocols including but not limited to HTTPS and SSH.
   - Students and teachers will access the curriculum and teaching materials through Google Drive.
   - Arduino software will need to be installed on computers. It is free to download on computers. There is a cloud based version that is also available but requires drivers to be downloaded and will not work on Chromebooks. There is also a Chrome App that can be purchased for $1/student per month (only required for one month). However, IT would have to install it on student chromebooks.
   - Teachers will need to share sample student work with their designated LSU Pathway Point-of-Contact.
   - Principals will need to communicate with the district's information technology department to ensure that there are no technological restrictions that block access to the LSU servers in the lsu.edu, college-readiness.lsu.edu or stempathways.lsu.edu domains on any port.In addition to the sites mentioned above, students will need web access to:

khanacademy.org	www.ucas.com	study.com	GoFormative
	kizoa.com	Animaker.com	band.us app
brainpop.com	wevideo.com	weebly.com	www.lsp.org
vimeo.com	Teach Computer Science & Coding to Kids - CS First	wix.com	Arhttps://sciencespot.net/Media/Solve%20the%20Outbreak_All.pdfduino.cc

Careers and Career Information - CareerOneStop	En.scratch-wiki.info	www.mynextmove.org	U.S. Bureau of Labor Statistics (bls.gov)
https://www.futurefabric.co/	http://www.panicstudio.tv/en/	https://www.hugeinc.com/	https://meat.agency/
https://simplychocolate.dk/	https://jamboard.google.com.	https://incompetech.com/music/royalty-free/?genre=Silent%20Film%20Score	https://www.tinkercad.com/learn/
canva.com	http://www.citationmachine.net/mla/cite-a-website	https://sciencespot.net	https://www.wikihow.com/Dust-for-Fingerprints
https://flexbooks.ck12.org/cbook/ck-12-middle-school-life-science-2.0/section/11.61/primary/lesson/barriers-to-pathogens-ms-ls	http://www.nih.gov	http://www.cdc.gov	https://www.nwabr.org/teacher-center/introductory-bioinformatics-genetic-testing#lessons
http://www.23andme.com	https://www.ncbi.nlm.nih.gov/	(http://blast.ncbi.nlm.nih.gov/Blast.cgi).	

3. Required teacher collaborations
   Teachers will communicate with LSU instructors via emails, apps hosted on the LSU servers, and the band.us app.
4. Required administration of course content, pre/post test, and research instruments
   All required materials and instruments will be either posted in the LSU servers, Google Drive, or their location announced via email or on Google drive.
7. Course Work
   Teachers must present the course material in sequence or as approved by collaboration with the LSU Pathway Point-of-Contact. Teachers are expected to deliver a minimum of 80% of the course material.
5. Other
   As this is a project-based learning class, we strongly suggest that each section of the course be limited to a *maximum* of 25 students. The course is dependent on the teacher providing feedback and reviewing student code. The course requires that teachers have adequate time to interact with each student.