BIOMEDICAL SCIENCES COURSE DESCRIPTIONS

Intro to Biomedical Sciences (9th Grade): This modular one-year course covers a large variety of fields in biomedicine. Each module is designed to take two to three weeks and provide students with opportunities to develop their public speaking and science literacy skills, as well as learn how to cooperate in a group efficiently and professionally. Topics include but are not limited to: sports medicine, pharmacology, psychology, nutrition, veterinary medicine, bioinstrumentation, biomedical engineering, forensic anthropology, parasitology, and speech pathology. Modules can be selected based on student interest, availability of potential guest speakers, or timing of field trips.

Comparative Anatomy & Physiology (9th or 10th Grade): This one-year course engages students in rigorous study of the body's physiological systems and then compares these systems across many species in the animal kingdom (both vertebrates and invertebrate). Course assignments range from formal assessments to hands on dissections and labs. Additionally, this course places an emphasis on public speaking through scientific presentations and independent research to enhance scientific reading and writing skills. Students will also learn to read and interpret published scientific articles to examine evolutionary relationships between species, making connections that will be built on in later bioinformatics studies.

Forensics (10th or 11th Grade): This is a one-year lab-intensive course that allows students to pursue an in-depth study of forensic science as a tool for collecting evidence and crime scene analysis. Areas of study include physical evidence, properties of matter and the analysis of glass, drugs, forensic toxicology, the microscope, forensic serology, DNA, trace evidence, fire investigation, investigation of explosives, fingerprints, ballistics, forensic anthropology, casts and impressions, document examination and computer forensics.

Bioinformatics (11th or 12th Grade): This course introduces bioinformatics to high school students, emphasizing searching and retrieving biological data, sorting the data, and finally analyzing the sorted data to draw meaningful conclusions. This course involves hands-on activities and projects on computers/laptops and teaches students how to relate the outcome of each activity to a real-life biological scenario. While moving through this course, students are introduced to cutting-edge bioinformatics resources and tools so that by the end of the course they are prepared to either pursue advanced college-level computational biological studies, or apply the knowledge gained in this course to tackle common bioinformatic tasks at a university-level biology research lab.

COMPUTING COURSE DESCRIPTIONS

Cyber Security: This is a full-year course designed to foster interest in Information Technology and networking careers. Through hands-on projects, students learn to install and administer operating systems, to have computers communicate with each other and to detect and repair vulnerabilities in systems and networks. This course also covers connections of computing and society, including ethics, security and privacy in on-line communication. Students taking this course will be expected to take the CompTIA IT Fundamentals+ certification exam.

Data Manipulation and Analysis: This course introduces students to the emerging field of Data Science. Instructional units cover the standard practices for effective data manipulation, analysis and interpretation as well as necessary concepts in the three disciplines involved (mathematics, statistics and computing.) Numerous examples of typical scenarios are provided. The emphasis on this course is in the application of the concepts rather than the theory. In the second semester, students will work in teams on large projects in which they will use programming to analyze large datasets and create models. The students will summarize their findings for each project in a written report and will also present them orally.

Introduction to Computational Thinking: This course introduces students to the basic ideas of computational thinking and its applications to problem solving in STEM fields. Students will use an open source, Web-based programming environment to create code for simple drawings, animations and simulations, through which they learn how to use abstraction, decomposition and pattern recognition to model problems and arrive at an algorithmic solution. Program code is presented with a dual purpose: as the main way to interact with a computer and as a proxy to organize ideas explicitly and communicate them to other people. Many examples are drawn from Algebra I and Geometry, so that students can visualize and manipulate the mathematical concepts in a more concrete form. Programming of images requires creativity, critical analysis, aesthetic awareness, and an understanding of decomposition of complex objects into geometric components. Students are encouraged to develop their own ideas while learning the elements and principles of visual design. Students are also taught the foundations in programming graphics, slideshow animations, and drawing using code. The curriculum of this course focuses on integrating computational thinking into the content areas of art, English, science, math, and social studies.

Programming for STEM: This course expands the practice of software development in a variety of settings, so that students acquire a broad set of programming skills and a deeper understanding of software engineering principles. Students learn to plan, design and implement relatively large programming projects that require background research and team work. Topics include simulations, games and interactive on-line applications. Robust program design and sound software engineering practices are emphasized throughout the course.

Survey Computer Science (8th or 9th grade): This one-year course can be taken in middle school for high school credit and counts as either a core course or as an elective course for the LSU Computing Pathway. It introduces the basics of computing using fun and engaging activities instead of formally describing the concepts. This course follows the framework of Seven Big Ideas adopted in the AP Computer Science Principles (CSP) course, but it has more emphasis on exploration and experimentation, and less emphasis on problem-solving and formal analysis than a regular CSP course. To prepare students for the rigors of other courses in the Pathways, this course models ways to adopt a productive disposition that fosters creativity and perseverance. In addition, career exploration lessons are threaded throughout the course, with a focus on developing students' interest in computing and identification with the computing professions.

DIGITAL DESIGN & EMERGENT MEDIA COURSE DESCRIPTIONS

Digital Storytelling: This is a project-based learning (PBL) inspired course that utilizes a PBL assessment guide in addition to thoughtful integrated learning. Throughout the course, experimentation and the practice of storytelling through the lenses of multiple mediums allows students to develop narrative reasoning skills, while simultaneously giving them a realm to be creative and challenged. The course was created in response to the demand from "entertainment" industries for individuals skilled in content creation and transfer of thinking. The purpose of this course is to get our students to become creators rather than just consumers. The course focuses on content creation, specifically in the realms of: Visual, Auditory, Videographic, and Interactive Storytelling. The course also focuses on Digital Literacy, and how to become a responsible denizen. At any point throughout the course, students use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

Programming Digital Media: Programming Digital Media introduces a broad array of topics related to digital media through project-oriented programming of graphics, audio, and hardware applications. The motivation for this course is to provide a basic introduction to computer programming using subjects that are relevant or appealing to students who are new to technological fields of study, with little to no prior programming experience. The course is presented in five segments, introducing coding, covering three distinct areas in digital media, plus a final integration project of these areas. There is a strong emphasis on computer programming tasks throughout, and the hands-on exercise of digital media tools in class is required. After an introduction to coding concepts, the first media topic introduces real-time graphics rendering and user interaction. The second introduces sound design. The third introduces basic electronics and physical computing. Finally, communication mechanisms are used allowing the disparate elements of graphics, sound, and hardware to be composed into interactive projects. This may be offered as a dual enrollment course thru LSU.

Coding for the Web: Coding for the web is an introductory course focusing on the foundational programming concepts in web development, such as: functions, loops, conditional statements, async functions, lambdas, as well as analyzing and solving problems like a programmer. Though this course is utilizing, HTML5, CSS3, JSS, and ES6, this is not a "web design" course. Students will have the skills, knowledge, and experience to create web applets by the end of the course. The main goal of this course is to develop students that have the ability to think critically about how to solve problems using computational thinking and good old-fashioned troubleshooting.

Digital Image: This course is based on hands-on training in the use of computer hardware and software to create digital graphics with Photoshop and Illustrator. As the student develops familiarity with these industry standard programs and graphic tools, 2D animation and design projects will be overseen by mentors. The 2D animation partition of the class focuses on rigging, planar tracking, rotoscoping and motion tracking in order to development, seamless continuity of character animation and dynamic set development. This may be offered as a dual enrollment course thru LSU.

Sound Design: Sound Design /Introduction to Computer Music (dual enrollment option) introduces students to a broad range of topics and concepts in electronic and computer music. This course covers principles of digital audio, sound design, synthesis, Digital Audio Workstations, and sound art composition. Assignments and activities include listening, analysis, discussion, and hands-on recording and composition exercises.

Motion Graphics: This course is based on hands-on training in the use of computer hardware and software to create digital graphics with Maya and Blender. As the student develops the familiarity with these industry standard programs and graphic tools, 3D animation and design projects will be overseen by mentors. The 3D animation partition of the class will focus on rigging, planar tracking, rotoscoping, motion tracking in order to development, seamless continuity of character animation and dynamic set development. This may be offered as a dual enrollment course thru LSU.

Film & TV (Pilot): This course serves as an introduction to the filming and production skills required to create audiovisual media in the realm of film and television. Students will learn the differences between various film and television styles (narrative film, video journalism, documentary, broadcast, etc.) and will learn proper videography, editing, and production skills through hands-on projects. This course is in active development and will be piloted during the 2020-2021 academic year. **Enrollment space is limited, and prior videography/video production experience is required. Please contact the DDEM pathway coordinators before enrolling in this course.**

MIDDLE SCHOOL COURSE DESCRIPTIONS

Intro to STEM Pathways (7th or 8th grade): This one-year course can be taken in middle school for high school credit and will count as a career class for LSU STEM Pathway students. The overarching goals of the course are to (a) help students develop 21st-century skills such as critical thinking, problem solving, collaboration, appropriate use of technology, meta-cognition, the engineering design process, as well as scientific analysis and (b) expand students' awareness of LSU's STEM Pathways in Biomedical Sciences, Computing, Digital Design & Emergent Media, and Pre-Engineering. The second semester of the course is identical to the material covered in the course **"Computing EveryWhere."**

Computing EveryWhere (7th or 8th grade): This one semester course can be taught as a stand-alone course or as the 2nd semester of the Intro to STEM Pathways course. It will cover basic computer terminology and usage, and connections of computing and society, including ethics, security and privacy in online communication. The primary goal of the course is that students reflect on how the Big Ideas in Computing from AP Computer Science Principles are relevant in their lives and want to learn more about them.

Survey Computer Science (8th or 9th grade): This one-year course can be taken in middle school for high school credit and counts as either a core course or as an elective course for the LSU Computing Pathway. It introduces the basics of computing using fun and engaging activities instead of formally describing the concepts. This course follows the framework of Seven Big Ideas adopted in the AP Computer Science Principles (CSP) course, but it has more emphasis on exploration and experimentation, and less emphasis on problem-solving and formal analysis than a regular CSP course. To prepare students for the rigors of other courses in the Pathways, this course models ways to adopt a productive disposition that fosters creativity and perseverance. In addition, career exploration lessons are threaded throughout the course, with a focus on developing students' interest in computing and identification with the computing professions.

PRE-ENGINEERING COURSE DESCRIPTIONS

Intro to Robotics: This beginning robotics course uses VEX EDR Robotics parts and VEXCode software to introduce the student to basic programming as well as problem solving strategies. This course will involve students in the development, building and programming of robots to accomplish various tasks. Students will work hands-on in teams to design, build, program and document their progress. Topics may include motor speed, gear ratios, torque, sensors, program loops, project documentation and decision-making. For second semester projects, students are broken into teams of two to three to understand autonomous programming using various sensors.

Intro to Engineering: This course introduces the profession, ethics, and diversity of the field of engineering to students in their freshman year of high school. The course will allow students to explore the 10 primary concentrations within engineering by listening to guest speaker lectures, working on an interactive project with a team, and presenting the results of their project to the class. The majors are: Biological Engineering, Civil Engineering, Environmental Engineering, Chemical Engineering, Computer Engineering/ Electrical Engineering, Computer Science, Construction Management, Industrial Engineering, Mechanical Engineering, and Petroleum Engineering. Specifically, this course will emphasize that the engineer is a team worker who needs strong skills in technical problem solving, engineering design, ethical decision making, and communicating to diverse audiences.

Engineering Economy: The Engineering Economy course is designed to teach students about the time value of money, cash flows occurring at different times with different amounts, and equivalence at different interest rates. These concepts will be used to evaluate engineering project proposals using well-accepted economic analysis techniques, such as present worth, future worth, capitalized cost, life-cycle costing, annual worth, rate of return, or benefit/cost analysis. Additionally, techniques such as replacement/retention studies, breakeven analysis, and payback analysis help make informed decisions about future uses of existing assets and systems.
Engineering Design: The primary intent of the course is to provide the student with the skills necessary to understand, interpret, and create engineering drawings and working sketches. The student will learn to create 3D models and engineering drawings using Inventor. In addition to developing spatial reasoning and technical drawing skills, students will work on technical writing skills and certain soft skills through journal article reflections, work ethic lessons, and oral presentations on various topics throughout the semester. The course will culminate with a 6-8 week long final project where students will work on teams to identify a problem, design a unique solution using Inventor, create a prototype on a 3D Printer, and then test the solution.
Principles of Engineering: This course is a sophomore-level survey of engineering course meant to be taken after Introduction to Engineering. The course continues to expose students to some of the major concepts that they will encounter in a postsecondary engineering course of study or in a technical career field. POE gives students the opportunity to develop skills and understanding of course concepts through activity-, project-, and problem-based (APPB) learning. Students will spend approximately 3 weeks exploring each discipline through concept lectures and hands on projects. Through these lectures and projects students will learn concepts such as, but not limited to, electrical circuitry, computer programming on Arduino's, Rube Goldberg machines, biomechanics, and pneumatics/hydraulic systems. Students will work in teams to develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also hone their 21st century skills by documenting their work and communicating their solutions to their peers and members of the professional community.
Advanced Robotics (VEX or FIRST, Pilot): This course will bring students into the world of competitive robotics. After completing Introduction to Robotics, students who are interested in joining a competition robotics team can join the advanced robotics course. This course will have a VEX and a FIRST Robotics option to allow schools the flexibility to meet the needs of their school. Curriculum for both robotics platform will exposed students to advanced building and programming techniques. Students are required to attend at least one weekend competition as part of the course.
Survey of Drones (Pilot): This course is designed as a senior capstone course and uses the fundamental skills learned in LSU's pathways pre-engineering courses to design, assemble, and program drones for use in indoor racing. Students will learn the fundamentals of frame design, electronics, and programming necessary to design their own drone. Students will work hands-on to design drone parts in Inventor, prototype the parts using a 3D printer, solder the electrical components of the drone, and program the microcontroller all will formally documenting their progress. Topics may include computer aided design, 3D printing, signal transmission, flight controller programming, motor design, aerodynamics, torque, sensors, project documentation, and racing using first person viewing goggles. We will obtain the FAA Drone pilots license during the first semester. For the second semester, students are broken into teams consisting of a driver, a builder, and a programmer to design their own drones.
VIRTUAL MATHEMATICS INSTITUTE PRAXIS PREP COURSE DESCRIPTIONS
Note: Teachers who wish to prepare for any Math Praxis Exam should enroll . They will be placed in appropriate courses based a pre-test.
Teaching Pre-Algebra: Teachers review and solidify their understanding of middle-school mathematics, while learning how to teach this material in a way that prepares students for algebra. Topics include: Numbers and Operations; Scientific Notation; Expressions; Equations; Inequalities; Ratio & Proportion; Percent; and Statistics and Probability. This is an entry-level course.
Learning and Teaching Algebra I: Topics align with the Louisiana State Standards for high-school mathematics and comparable national standards, including Numbers, Operations & Expressions; Equations; Graphing Linear Equations; Systems of Linear Equations; Solving & Graphing Linear Inequalities; Solving Absolute Value Equations & Inequalities; Quantitative Reasoning; Functions; Exponential Functions; Polynomials; Quadratic Equations; Non-linear Functions; and Data & Statistical Analysis.
Learning and Teaching Geometry: This course is for teachers who intend to become middle or high school mathematics teachers. This is a proof-based course that requires teachers to develop skills in writing deductive geometric proofs. It includes topics from the Louisiana State Standards for Mathematics. The focus is the conceptual development of points, lines, planes, angles & proofs and their application to the understanding of triangles, similar triangles & trigonometry, congruent triangles, circles, analytic geometry, transformations, quadrilaterals, area, volume, and probability.
Middle School Mathematics Capstone with PRAXIS 5169 Review: This course is for teachers to review and extend their prior study of mathematics in the realms of numbers & operations; algebra; functions and their graphs; geometry & measurement; and probability, statistics & discrete mathematics. This course serves as a review for the Middle School Mathematics Praxis Test (5169).
Algebra Capstone with Praxis 5162 Review: This course provides a review for the Algebra Mathematics Praxis Test (5162).
High School Math Capstone with Praxis 5161 Review: This course is for teachers to review and extend their prior study of mathematics in the realms of number & quantity; algebra; functions; calculus; geometry; probability & statistics; and discrete mathematics. This capstone course serves as a review for the Mathematics Content Knowledge Praxis Test (5161). NOTE. Teachers may require additional courses in Algebra II and Pre-Calculus to prepare for this course. These additionakl courses will be scheduled as needed, based on need.