SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS

ALABAMA

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Invent the Future

Your guide to careers in NCE, TECHNOLOGY, Ξ EER 63 **THEMATICS**

Great Career Ideas • Creating Your Plan • College Resources





A message from . . .



Robert Bentley, Governor of Alabama

The investments we make in our students today will help shape their futures for years to come. Our students are destined to become high-performing

professionals in all sectors of the workforce.

Alabama SUCCESS is an initiative designed to help students access valuable information about current careers, postsecondary learning, and financial literacy resources.

Our goal is to give students the opportunities they need to prepare themselves for success. We want our students to be well-equipped for top careers in Alabama's workforce – which has a growing influence on the global marketplace.

This Alabama SUCCESS guide is a great resource to assist in preparing for a bright and successful future.



Dr. Thomas R. Bice, Alabama State Superintendent of Education

Alabama SUCCESS is an invaluable resource designed specifically for students. By

learning about actual career fields and the education and experience required for specific jobs, you will be better able to figure out what you want to do after high school and what you need to do to achieve your goals.

his guide is part of a series created to help students in Alabama learn more about careers, salaries, and the steps they need to take to reach their goals. By connecting what they learn in the classroom to real jobs that interest them, Alabama students will graduate better prepared for life and work. You can help your child use this guide by:

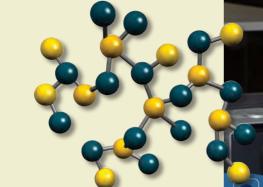
FOR STUDENTS SYS

- Talking to your child about what careers interest him or her-and why
- Sharing your work experiences-pro and con-with your child
- Asking people in your community who work in jobs that interest your child to talk about their careers or to let your child visit their workplace.



SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS





What Employers

Byron Dunn, President Gulf States Shipbuilders Consortium, Mobile

strong background in science, technology, engineering, or math is required to be successful in *any* field. Having a strong background in all of these areas gives

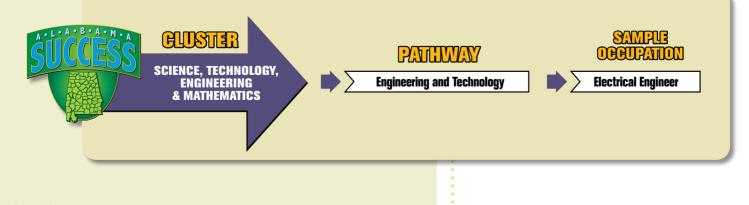
someone the ability to succeed and advance to the highest levels in the field of their choice.

In years past, someone could earn a good living by simply being strong and working hard at manual labor. Today, every industry from farming to space exploration uses technology that did not even exist when your parents were your age.

You have to understand that learning can never stop. Getting a high school diploma or a college degree is not the end to your education; it is only the beginning. New technologies affect every industry every day. You must always be willing and eager to learn new things.

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Science, Technology, Engineering & Mathematics

STEM professionals create new tools, materials, and processes; invent new ways to communicate; and improve lives by solving problems. This is a fast-paced, project-based cluster in which many of the careers haven't even been created vet.

DECID



Do you get good grades in math and science?

WHY IT MATTERS:

To succeed in any STEM-related career, you need to enjoy and understand math and science.



WHY IT MATTERS:

STEM professionals are creative thinkers who use technical knowledge, high-tech tools, and hands-on skills to solve problems.

Does the Science, Technology, Engineering & Mathematics (STEM) career cluster fit you, your talents, and your dreams? Take this quick quiz to find out.



Do you like working on projects as part of a team?

WHY IT MATTERS:

STEM jobs are project-based, so you need to be able to communicate and work well with others. : attention to detail.

Do you enjoy measuring

and mapping data and details?

WHY IT MATTERS:

Numbers really count in STEM jobs, where projects require focus, patience, and

Would you like to fly airplanes and explore the solar system?

WHY IT MATTERS:

A strong STEM background is required to launch a career as a pilot, astronaut, or astrophysicist.

If you answered "yes" to most of these questions, Science, Technology, Engineering & Mathematics could be right for vou.



YOUNG PROFESSIONAL PROFILE

NAME: Jameela Pickens

EDUCATION: Hoover High School, Hoover; Auburn University, Auburn–Electrical Engineering, Bachelor of Science Degree

The summer after high school graduation, Jameela Pickens interned in the Distribution Engineering department at Alabama Power Company. She earned the internship by excelling in her high school math and science classes. Today, she works in the same department as a distribution engineer, designing ways for residential, commercial, and industrial customers to receive power.

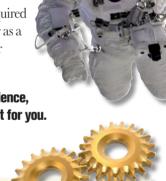
"In high school," she says, "I took higher-level math and science classes such as advanced placement calculus and physics. These classes formed a solid base for excelling in my college coursework. My summer internship experience further confirmed my desire to pursue an engineering degree."



Explore STEM education and career options in Alabama at the Alabama Mathematics, Science, and Technology Education Coalition website.

CLUSTER PROFILE





MAKE A PLAN

Sit down with your parents and counselor and create a plan.

Map out an Alabama Education Plan (sample at right) based on your interests. strengths, and possible career goals.

Your plan outlines the courses and electives you'll take in high school, plus related clubs and career preparation. Your counselor will work with you to determine the learning experiences needed for you to complete your plan, such as using distance learning or earning college credit from your local community college.

Here's a sample Alabama Education Plan for you to use as a guide.

ARTICULATION AGREEMENT

is a fancy term for a simple education agreement that can streamline your road to a successful career.

Statewide articulation agreements link all high schools and two-year colleges in Alabama. They provide credit at two-year colleges for coursework mastered at the high school level.

of Engineering CTE Course II Government and Biomedical Equipment Technician Option (A.A.S.) Economics Physics English 12 Industrial Electronic Controls **Required and CTE Courses** Applied Electronic Computation General Education Requirements English Composition I English Composition I or SPH 106 **Biomedical Electronics** Concepts of Solid State Electronics Electro-Optics Humanities Elective

Social Studies

World History

1500-Present

United States History to 1877

United States History to Present

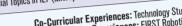
Science

Physical Science

Biology

Chemistry

- Concepts of Digital Electronics
- Concepts of Electronic Circuits
- **Circuit Fabrication** Special Topics in ILT (Microprocessors)



Other Optional Courses

Computer Applications Physical Education Foreign Language I**

Foreign Language I
 Foreign Language II**
 CTE Course I—Foundations

Health
 Fine Arts

8th Grade: Interest inventory and education plan initiated for all learners Education and Career Assessments: 11th Grade: College placement assessment

History, Social, or Behavioral Science

Career Learning Experiences: Career preparation—paid and unpaid, internships, job shadowing

Intermediate College Math

Microcomputer Applications

Orientation for Career Students

Math or Science Elective

Co-Curricular Experiences: Technology Student Association (TSA) Extracurricular Experiences: FIRST Robotics Service Learning Experiences: Service project to adapt computers to make them accessible for seniors with disabilities

Electro-Optics Lab

Cooperative Education

This is a sample plan and should not be considered a definitive plan for any student interested in this career cluster *Statewide articulated course Is a sample plan and shown not be considered a deminate plan of any statistic **Alabama First Choice diploma requires 2 years of the same foreign language.

Articulation agreements can take you down your career pathway as well. In many cases, students transferring from two-year to four-year colleges and universities can complete four-year general studies core course requirements before they transfer.

Get Career Credentials

If you're a student in a career and technical education (CTE) program, you may have the option of earning a Career Readiness Certificate along with your high school diploma. The nationally recognized certificate shows you're proficient in applied math, reading for information, and locating information-skills employers highly value. Ask your school counselor about the statewide program; if it's not in your high school now, it will be implemented soon.

Name: Jordan Smith Diploma Option: Advanced Career and Technical Endorsement Cluster: Science, Technology, Engineering & Mathematics

Alabama Education Plan

English

English 9

English 10

English 11

Pathway: Engineering and Technology

Math

Algebra I

Geometry

Algebra II with

Trigonometry

Pre-Calculus or Calculus

9th Grade

11th Grade

12th Grade

Community College

Higher Educatior

Career Goal: Biomedical Equipment Technician Postsecondary Goal: Associate in Applied Science Degree



npling of Career and Technical lucation Courses in Pathway

Foundations of Engineering Engineering Applications Engineering Research and Design Engineering Systems



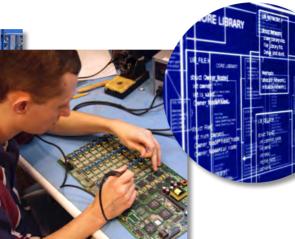
SUCCESS CAREER IDEAS

Need-to-know facts and figures about real Alabama jobs, salaries, and education options in Science, Technology, Engineering & Mathematics.

The 12 careers highlighted on the next page are a sampling of occupations in the **Science**, **Technology, Engineering & Mathematics** cluster in Alabama. The charts include occupation name, description, plus wages for workers just starting out in the profession, average wages for those in the occupation, and the wages earned by experienced workers in the job (see "How to Read Job Charts"). The bar below the occupation's name contains the Standard Occupational Code (SOC); use the SOC to look up more information about the career in online databases such as O*NET (see below). The bars are also color-coded to indicate the minimum level of education required for each profession.

For further information on occupations in all career clusters, go to the O*NET database.





How to Read Job Charts

Starting Hourly Wage • Average Hourly Wage • Experienced Hourly Wage • Occupation Name • SOC Number • Minimum Education Level • (indicated by color bar) Occupation Description • EDUCATION LEVELS • On-the-Job Training • Work Experience in a Related Uccupation • Postsecondary • Vocational Training • Associate's Degree • Bachelor's Degree

Source: Alabama Department of Industrial Relations, Labor Market Information Division.

Doctoral Degree

Check Out These Three COOL CAREERS

Electronics Drafter

WHAT: Draw the wiring diagrams, circuit board assembly diagrams, schematics, and layout drawings used to manufacture, install, and repair high-tech electronic equipment.

WHO: Electronics drafters are detail oriented and have excellent design and visual abilities. They use mathematics and mechanical knowledge to create exact blueprints.



Geoscientist

WHAT: Use geological, physics, and mathematics knowledge to study the earth's internal structures, atmospheres, and oceans, and its magnetic, electrical, and gravitational forces.

WHO: Geoscientists use high-tech tools to search for natural resources, improve waste disposal processes, reclaim land, create geological maps, and solve environmental problems.



Sound Engineering Technician

WHAT: Operate machines and equipment to record, synchronize, mix, or reproduce music, voices, or sound effects in sports arenas, theater productions, recording studios, or movie and video productions.

WHO: Sound or broadcast engineers have specialized computer, electronics, and engineering training related to the operation of high-tech recording and broadcast equipment. Since sound technology changes rapidly, sound engineers need to stay up to date on the latest advances in equipment and techniques.





Industrial Engineer

SOC: 17-2112

Design, develop, test, and evaluate systems for managing industrial processes.



Engineering Technician (Except Drafter)

SOC: 17-3029

Work under an engineering staff to perform tasks related to engineering and engineering technologies.



Agricultural Engineer

SOC: 17-2021

Use knowledge of engineering technology and biological science, and address agricultural problems related to machinery used in agricultural processing.



Surveving and **Mapping Technician**

SOC: 17-3031

Perform surveying and mapping duties to collect data for construction, mapmaking, mining, or other purposes.



Biological Technician SOC: 19-4021

Assist biological scientists with laboratory work on a wide range of biological organisms.



Chemical Engineer SOC: 17-2041

Design equipment and processes for manufacturing chemicals and products.



Computer and Information Systems Manager SOC: 11-3021

Conduct research into fundamental computer and information science as theorists, designers, or inventors.



Aerospace Engineer SOC: 17-2011

Design, construct, and test aircraft, missiles, and spacecraft.



Environmental Scientist and Specialist SOC: 19-2041

Conduct research or perform investigations into pollutants or hazards affecting the environment or public health.



Career and Technical Education Teacher (Postsecondary) SOC: 25-1194

Teach career and technical subjects at the college level to prepare students for STEM-related careers.



Chemical Technician SOC: 19-4031

Conduct chemical and physical laboratory tests to help scientists analyze solids, liquids, and gaseous materials.



Electrical and Electronics Engineering Technician

Research, design, develop, and test electronic components and systems.

Now is the time to take a fresh look at STEM careers you may not have considered before.



Rent and utilities:

\$700-\$800

(1-bedroom)

Groceries:

\$200-\$250

MYTH: Engineering is boring.

FACTS: Engineers are high-tech explorers who use new and exciting technologies like robotics to solve problems, discover better ways of doing things, and design the latest toys, tools, and modes of transportation. The work involves interesting hands-on projects in both indoor and outdoor settings. Engineering assignments can be found in nearly every Alabama industry, including aeronautics, video game design, shipbuilding, and power generation.

Reality Check

What It Costs to Live on Your Own in Alabama

Estimated 2009-2010 monthly expenses for a 22-year-old living in Birmingham.

Note: Keep in mind that your paycheck will be reduced by about 30 percent to cover taxes, retirement, and insurance. What's left is known as your "take-home pay." Subtract 30 percent from the salaries shown on page 5 to get a more accurate take-home amount.

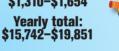
Monthly total: \$1,310-\$1,654

11111

Gasoline:

\$124

(1,000 miles @ \$3.10 per gallon 25 MPG)





Car insurance: \$30-\$95

(Used 2010/2011 4-door)

Cable and Internet: \$90

Cell phone:

\$70



Check "OUT

Most Alabama schools offer these student organizations related to the STEM career cluster:



SkillsUSA

SkillsUSA is a partnership of students, teachers, and industry working to ensure American has a skilled workforce. Programs include student competitions and employer-driven training in all career and technical education areas.





Technology Student Association (TSA)

TSA prepares students to meet the challenges of a high-tech world by promoting technological literacy, leadership, and problem-solving skills. Members have opportunities to develop and showcase their technology skills through individual and team competitions.



Take It to the **Next Level**

n Alabama, the learning doesn't stop with high school graduation. Here is a list of public postsecondary (after high school) institutions that may offer programs related to this cluster.

Two-Year Institutions Offering Certificates or Associate's Degrees

- Alabama Southern Community College, Monroeville
- Bevill State Community College, Sumiton
- Bishop State Community College, Mobile
- Calhoun Community College, Decatur
- Central Alabama Community College, Alexander City
- Chattahoochee Valley Community College, Phenix City
- Enterprise-Ozark Community College, Enterprise
- Faulkner State Community College, Bay Minette
- Gadsden State Community College, Gadsden
- H. Councill Trenholm State Technical College, Montgomery
 Jefferson Davis Community College, Brewton
- Jefferson State Community College, Brewton
- J.F. Drake State Community College, Huntsville
- J.F. Ingram State Technical College, Deatsville
- Lawson State Community College, Birmingham
- Lurleen B. Wallace Community College. Andalusia
- Marion Military Institute, Marion
- Northeast Alabama Community College, Rainsville
- Northwest-Shoals Community College, Muscle Shoals
- Reid State Technical College, Evergreen
- Shelton State Community College, Tuscaloosa
- Snead State Community College, Boaz
- Southern Union State Community College, Wadley
- Wallace Community College (Selma), Selma
- Wallace State Community College (Dothan), Dothan
- Wallace State Community College (Hanceville), Hanceville

Four-Year Institutions Offering Bachelor's, Master's, Doctoral, or First Professional Degrees

- Alabama A&M University, Normal
- Alabama State University, Montgomery
- Athens State University, Athens
- Auburn University, Auburn
- Auburn University at Montgomery, Montgomery
- Jacksonville State University, Jacksonville
- Troy University, Troy
- Troy University Dothan, Dothan

- Troy University (Montgomery), Montgomery
- University of Alabama at Birmingham, Birmingham
- University of Alabama in Huntsville, Huntsville
- The University of Alabama, Tuscaloosa
- University of Montevallo, Montevallo
- University of North Alabama, Florence
- University of South Alabama, Mobile
- University of West Alabama, Livingston

Certifications

While attending high school and postsecondary institutions, all Alabama students should consider getting certifications related to their career cluster of interest. These certifications can improve a student's skill set, as well as increase the student's overall chance of gaining employment in the field.

7

HIGH SCHOOL PROGRAM

GRADE 9 FRESHMAN YEAR

- Research your career options based on your interests, talents, and goals.
- Choose a career cluster.
- Create an Alabama Education Plan (see page 3).
- Do your best work in all your classes. Course selection and grades really do count when you are applying to colleges and training programs.
- Keep a folder or portfolio of your activities, awards, accomplishments, and work experience, and add to it during your high school career.

GRADE 10 Sophomore year

- Continue building the strongest possible academic record.
- Consider taking the PLAN (pre-ACT) if you plan to apply to a two-year college or university in the future.
- Consider taking the PSAT (preliminary) SAT/National Merit Scholarship Test) if you plan to apply to a two-year college or university in the future.
- Use the information in your portfolio to create a resume.
- Apply for summer jobs, internships, or volunteer activities related to your career cluster.

GRADE 11 JUNIOR YEAR

- Take the PSAT/NMSOT.
- Use resources available at your school (books, online tools, college fairs, etc.) to research postsecondary education options related to your career goals.
- Register to take either the ACT or the SAT I and SAT II Subject Tests. There are testing dates every month from January through June. Registration deadlines are approximately four weeks before each testing date.
- Apply for summer jobs, internships, and volunteer activities related to your career goals.

GRADE 12 SENIOR YEAR

- In the fall, apply to postsecondary programs and retake any standardized college admissions tests if you would like to improve your score.
- Beginning in November, complete college financial aid forms. Deadlines and required data differ from school to school, so read the instructions carefully.
- In the spring, choose your postsecondary program on the basis of where you have been accepted, costs, etc.
- Continue doing your best work. Most schools require a final transcript before making your acceptance official.



COLLEGE PREP: Getting Accepted

The college admissions process can be stressful and a bit scary, especially if you are the first in your family to apply. Give yourself the best shot at getting into a college program that matches your goals by following these five steps:

1. Make the Grade Your grade point average really does count. so do vour best work on every assignment, pay attention in class, and participate in group discussions.

2. Get Involved

leadership skills by joining

clubs and teams at your

school, volunteering for

service projects, and

participating in church

or community activities.

Build teamwork and

3. Make a List

Before you can apply to college, you have to figure out what you would like to study and what matters most to vou (like location, size, or religious affiliation). Use the college guides in your local library, school library, or counselor's office to start making a list of colleges that interest you.

4. Plan for Tests

Most colleges want scores from the ACT, SAT, or SAT II tests. See what tests the schools on your list require. sign up to take them in time to include the scores on your application, and then practice the free SAT sample questions.

5. Be Neat and Complete

Before you send in a college application, double-check your spelling, make sure nothing is missing, and save a copy just in case you have to submit it again.

PAYING YOUR WAY:

Every Alabama student can afford to go to college. It just takes a little planning. Put your college dreams within financial reach by taking these five steps:

1. Consider a **Community College**

Alabama's public and private two-year colleges offer an affordable way to earn an associate's degree or complete enough credits to transfer into a four-year school as a junior.

2. Weigh Your Options Attending

one of Alabama's four-year public or private schools cuts travel costs and other living expenses, as compared to attending schools out of state. In addition, public schools offer reduced in-state tuition, and, if there's a college nearby, you can save even more by living at home.

3. Rise to the Top

Apply to a couple of schools at which your grades and accomplishments put you near the top of the typical applicant pool. Since your application will stand out, you'll be more likely to qualify for scholarships and other merit aid.

Financial Aid

4. Do a Little Digging

More than one million local, national, and college-specific scholarships are available each year. Ask your school librarian and counselor for help finding printed scholarship resource guides. To find and apply for scholarships online, sign up for the free college scholarship search source.

5. Apply for Aid

Fill out the Free Application for Federal Student Aid (FAFSA) as soon as possible after January 1 of the year you'll be starting college. FAFSA forms and instruction booklets are available in your quidance counselor's office. Some schools also require the CSS/Financial Aid Profile form, and others have their own financial aid forms. Carefully read each college's application to figure out what forms you need to submit and when.



Articulation agreements: formal agreements between or among educational organizations (high schools, community colleges, and universities) that allow students to receive college credit for courses taken in high school.

Associate's degree: a two-year degree awarded by a community college.

Bachelor's degree: a four-year degree awarded by a college or university.

Career and technical student organizations (CTSOs): co-curricular organizations for students that offer activities and competitions related to particular careers.

Career Clusters: identifies pathways from high schools to two- and four-year colleges, technical schools, graduate schools, apprenticeship programs, and workplace so that learners can recognize the relationship between what they learn in school and what they can do in the future.

Career Pathways: pathways are sub-groupings of occupations/career specialties. Occupations/Career specialties are grouped into Pathways based on the fact that they require a set of common knowledge and skills for career success.

Doctoral degree: a degree awarded by universities for study beyond a master's degree. May also be called a Ph.D. or a first professional degree.

Dual enrollment: a program between Alabama public colleges and universities and local boards of education that allows high school students to enroll in certain approved college-level courses to receive both high school and college credit. **ECEP** (Early College Enrollment Program): a program that allows juniors and seniors to have full-time enrollment at an Alabama public college or university while still graduating with their class and staying involved with high school activities.

Extended learning experiences: participation in career and technical student organizations, co-curricular activities, job shadowing, internships, or community service.

Internship: an extended learning experience that gives students an opportunity to work temporarily at an entry-level job in a career that interests them.

Job shadowing: an extended learning experience in which students observe professionals in particular careers as they go through a day on the job.

Master's degree: a degree awarded by universities for study beyond a bachelor's degree.

Postsecondary education: education beyond high school. Middle and high school are referred to as *secondary education*, so *postsecondary* means after high school.

STARS (State Transfer & Articulation Reporting System):

STARS System allows public two-year students in Alabama to obtain a Transfer Guide/Agreement for the major of their choice. This guide/agreement, if used correctly, guides the student through their first two years of coursework and prevents loss of credit hours upon transfer to the appropriate public four-year university in Alabama.



Resource Shelf

Use these websites and other resources available from your school counselor to learn more about careers, career clusters, and educational and job opportunities in high school and beyond.

ACCESS

ACCESS (Alabama Connecting Classrooms, Educators, and Students Statewide) Distance Learning provides opportunities and options for Alabama public high school students to engage in advanced placement (AP), elective, and other courses to which they may not otherwise have access.

Alabama Career Information Network

This new Web portal increases Alabama students' and families' access to valuable career exploration activities and college financial aid information.

Alabama Commission on Higher Education

Click on "Colleges & Universities" within this website for a list of four-year institutions in Alabama.

The Alabama Community College System Learn all about the public and private two-year colleges in Alabama. Connect directly to each school's website to see the courses, majors, degrees, and scholarships it offers to Alabama students.

Alabama Tech Prep

This booklet is sponsored by Alabama Tech Prep. The goal of Tech Prep is to create a smooth transition from high school to college and to a career.

Alabama Virtual Library

This Alabama Legislature–funded site provides all students, teachers, and citizens of the State of Alabama with online access to essential library and information resources.

America's Career InfoNet

Use this site to search for occupational information, industry information, and state-specific labor market information.

Career Voyages

This career planning resource helps students, parents, career changers, and career advisors.

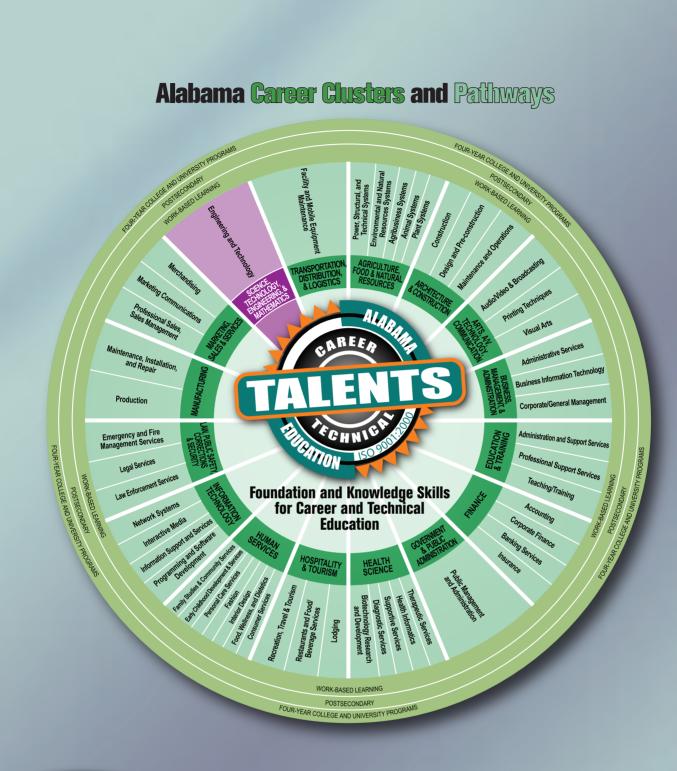
O*NET (Occupational Information Network)

O*NET provides full information on occupations, including state-bystate salary data, employment prospects, and skill matching for students.

U.S. Department of Labor Occupational Outlook Handbook

A valuable resource for both counselors and students, this federal website offers updated information on careers, job responsibilities and working conditions, salaries, and what jobs will be available in the future.







Contact Information

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STATE OF ALABAMA • DEPARTMENT OF EDUCATION • Thomas R. Bice, state superintendent of education 9/12