

**WEST JEFFERSON HILLS SCHOOL DISTRICT
APPLIED CHEMISTRY CURRICULUM**

GRADE 10

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.1. Unifying Themes						
A. Apply concepts of systems, subsystems feedback, and control to solve complex technological problems.	<ul style="list-style-type: none"> •Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. •Analyze and describe the function, interaction, and relationship among subsystems and the system itself. •Compare and contrast several systems that could be applied to solve a single problem. 	<ul style="list-style-type: none"> •Direct Instruction •Molecular Models •Partner Work •Group Work •Lab Work •Demonstrations (chemical) •Graphing/Analysis •Computer Projects •Cooperative Learning •Guided/Paired/independent Reading •Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

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3.1 Unifying Themes						
B. Describe concepts of models as a way to predict and understand science and technology. Apply concepts of models as a method predict and understand science and technology.	<ul style="list-style-type: none"> • Distinguish between different types of models and modeling techniques and apply their appropriate use in specific applications (e.g., kinetic gas theory, DNA). • Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability). • Evaluate technological processes by collecting data and applying mathematical models (e.g., process control). • Apply knowledge of complex physical models to interpret data and apply mathematical models. 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/ Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

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3.1 Unifying Themes						
	<ul style="list-style-type: none"> •Apply mathematical models to science and technology. •Appraise the importance of computer models in interpreting science and technological systems. 					

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3.1 Unifying Themes						
D. Apply scale as a way of relating concepts and ideas to one another by some measure. Analyze scale as a way of relating concepts and ideas to one another by some measure.	<ul style="list-style-type: none"> • Apply dimensional analysis and scale as a ratio. • Convert one scale to another. • Compare and contrast various forms of dimensional analysis. • Assess the use of several units of measurement to the same problem. • Analyze and apply appropriate measurement scales when collecting data. 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

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3.1 Unifying Themes						
E. Describe patterns of change in nature, physical and man made systems. Evaluate change in nature, physical systems, and man made systems.	<ul style="list-style-type: none"> • Describe how fundamental science and technology concepts are used to solve practical problems (e.g., momentum, Newton’s laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur’s germ theory, relativity, heliocentric theory, gas laws, feedback systems). • Recognize that stable systems often involve underlying dynamic changes (e.g., a chemical reaction at equilibrium) 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

	has molecules reforming continuously).					
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3.1 Unifying Themes						
	<ul style="list-style-type: none"> • Describe the effects of error in measurements. • Describe changes to matter caused by heat, cold, light or chemicals using a rate function. • Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories). • Analyze how models, systems, and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, 					

	cause of fire). • Explain how correlation of variable does not necessarily imply causation.					
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3.2 Inquiry and Design						
A. Apply knowledge and understanding about the nature of scientific and technological knowledge. Evaluate the nature of scientific and technological knowledge.	<ul style="list-style-type: none"> • Compare and contrast scientific theories and benefits. • Know that science uses both direct and indirect observation means to study the world and the universe. • Integrate new information into existing theories and explain implied results. • Know and use the ongoing scientific processes to continually improve and better understand how things work. • Critically evaluate the status of existing theories (e.g., germ theory of 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

	disease, wave theory of light, classification of subatomic particles, theory of evolution, epidemiology of aids).					
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3.2 Inquiry and Design						
<p>B. Apply process knowledge and organize scientific and technological phenomena in varied ways.</p> <p>Evaluate experimental information for appropriateness and adherence to relevant science processes.</p>	<ul style="list-style-type: none"> • Describe materials using precise quantitative and qualitative skills based on observations. • Develop appropriate scientific experiments: raising questions, formulating hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data, and producing solutions. • Use process skills to make inferences and predictions using collected information and to communicate, using space/time relationships, defining operationally. • Evaluate experimental data 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

	correctly within experimental limits.					
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3.2 Inquiry and Design						
	<ul style="list-style-type: none"> •Judge that conclusions are consistent and logical with experimental conditions. •Interpret results of experimental research to predict new information or improve a solution. 					

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3.2 Inquiry and Design						
C. Apply the elements of scientific inquiry to solve problems. Apply the elements of scientific inquiry to solve multi-step problems.	<ul style="list-style-type: none"> • Generate questions about objects, organisms, and/or events that can be answered through scientific investigations. • Evaluate the appropriateness of questions. • Design an investigation with adequate control and limited variables to investigate a question. • Conduct a multiple step experiment. • Organize experimental information using analytic and descriptive techniques. 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and Journals 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

	<ul style="list-style-type: none"> • Judge and evaluate the significance of experimental information in answering the question. • Suggest and project additional questions from a research study that could be studied. 					
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3.2 Inquiry and Design						
D. Identify and apply the technological design process to solve problems.	<ul style="list-style-type: none"> • Examine the problem; rank all necessary information and all questions that must be answered. • Propose and analyze a solution. • Implement the solution. • Evaluate the solution, test, redesign, and improve as necessary. • Communicate the process and evaluate and present the impacts of the 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing Programs

	solution.		Journals			
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3.4 Physical Science, Chemistry, and Physics						
<p>A. Explain concepts about the structure and properties of matter.</p> <p>Apply concepts about the structure and properties of matter.</p>	<ul style="list-style-type: none"> Know that atoms are composed of even smaller sub-atomic structures whose properties are measurable. Explain the repeating pattern of chemical properties by using the repeating patterns of atomic structure within the periodic table. Predict the behavior of gases through the use of Boyle's Charles' or 	<ul style="list-style-type: none"> Direct Instruction Molecular Models Partner Work Group Work Lab Work Demonstrations (chemical) Graphing/Analysis Computer Projects Cooperative Learning Guided/Paired/ independent Reading Note guides 	<ul style="list-style-type: none"> Textbook/ Supplements PowerPoint Lab Manual Periodic Table Calculators Handouts Lab Equipment Model Kits Measuring Devices Computer (classroom) Computer (lab) Excel Chemicals Internet Magazines and Journals 	<ul style="list-style-type: none"> Teacher Observation Tests Quizzes Problem Solving In-Class Work Homework Lab write-ups Midterms Final Notebook check Rubric Peer Evaluation 	<ul style="list-style-type: none"> Review and Re-teach Small Group Instructions Access to Learning Support Teachers Adapted Lessons Extended Time Tutoring Technology 	<ul style="list-style-type: none"> Additional Reading Science Competition Science Fairs Independent Projects Field Trips Science Clubs Summer Assignments Internships Science Honors Institute Shadowing

	<p>the ideal gas law, in everyday situations.</p> <ul style="list-style-type: none"> Describe phases of matter according to the Kinetic Molecular Theory. 					Programs
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3.4 Physical Science, Chemistry, and Physics						
	<ul style="list-style-type: none"> Explain the formation of compounds and their resulting properties using bonding theories (ionic and covalent). Recognize formulas for simple inorganic compounds. Describe various types of chemical reactions by applying the laws of conservation of mass and energy. Apply knowledge of mixtures to appropriate separation techniques. 	<ul style="list-style-type: none"> Direct Instruction Molecular Models Partner Work Group Work Lab Work Demonstrations (chemical) Graphing/Analysis Computer Projects Cooperative Learning Guided/Paired/independent Reading Note guides 	<ul style="list-style-type: none"> Textbook/ Supplements PowerPoint Lab Manual Periodic Table Calculators Handouts Lab Equipment Model Kits Measuring Devices Computer (classroom) Computer (lab) Excel Chemicals Internet Magazines and 	<ul style="list-style-type: none"> Teacher Observation Tests Quizzes Problem Solving In-Class Work Homework Lab write-ups Midterms Final Notebook check Rubric Peer Evaluation 	<ul style="list-style-type: none"> Review and Re-teach Small Group Instructions Access to Learning Support Teachers Adapted Lessons Extended Time Tutoring Technology 	<ul style="list-style-type: none"> Additional Reading Science Competition Science Fairs Independent Projects Field Trips Science Clubs Summer Assignments Internships Science Honors Institute Shadowing

	<ul style="list-style-type: none"> • Understand that carbon can form several types of compounds. 		Journals			Programs
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3.4 Physical Science, Chemistry, and Physics						
<p>A. Explain concepts about the structure and properties of matter.</p> <p>Apply concepts about the structure and properties of matter.</p>	<ul style="list-style-type: none"> • Apply rules of systematic nomenclature and formula writing to chemical substance. • Classify and describe, in equation form, types of chemical and nuclear reactions. • Explain how radioactive isotopes that are subject to decay can be used to estimate the age of materials. • Explain how the forces that bind solids, liquids, and gases affect their 	<ul style="list-style-type: none"> • Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent Reading • Note guides 	<ul style="list-style-type: none"> • Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet • Magazines and 	<ul style="list-style-type: none"> • Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation 	<ul style="list-style-type: none"> • Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology 	<ul style="list-style-type: none"> • Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors Institute • Shadowing

	properties. • Characterize and identify important classes of compounds (e.g., acids, bases, salts).		Journals			Programs
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3.4 Physical Science, Chemistry, and Physics						
	<ul style="list-style-type: none"> • Apply the conservation of energy concept to fields as diverse as mechanics, nuclear particles and studies of the origin of the universe. • Apply the predictability of nuclear decay to estimate the age of material that contain radioactive isotopes. • Quantify the properties of matter (e.g., density, solubility coefficients) by 					

	applying mathematical formulas.					
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3.4 Physical Science, Chemistry, and Physics						
<p>B. Analyze energy sources and transfers of heat.</p> <p>Apply and analyze energy sources and conversions and their relationship to heat and temperature.</p>	<ul style="list-style-type: none"> Determine the efficiency of chemical systems by applying mathematical formulas. Use knowledge of chemical reactions to generate an electrical current. Evaluate energy changes in chemical reactions. Determine the heat involved in illustrative chemical reactions. Evaluate mathematical formulas that calculate the efficiency of specific chemical and mechanical 	<ul style="list-style-type: none"> Direct Instruction Molecular Models Partner Work Group Work Lab Work Demonstrations (chemical) Graphing/Analysis Computer Projects Cooperative Learning Guided/Paired/independent Reading 	<ul style="list-style-type: none"> Textbook/Supplements PowerPoint Lab Manual Periodic Table Calculators Handouts Lab Equipment Model Kits Measuring Devices Computer (classroom) Computer (lab) Excel Chemicals Internet 	<ul style="list-style-type: none"> Teacher Observation Tests Quizzes Problem Solving In-Class Work Homework Lab write-ups Midterms Final Notebook check Rubric Peer Evaluation 	<ul style="list-style-type: none"> Review and Re-teach Small Group Instructions Access to Learning Support Teachers Adapted Lessons Extended Time Tutoring Technology 	<ul style="list-style-type: none"> Additional Reading Science Competition Science Fairs Independent Projects Field Trips Science Clubs Summer Assignments Internships Science Honors Institute

	systems. •Use knowledge of oxidation and reduction to balance complex reactions. •Apply appropriate thermodynamic concepts (e.g., conservation, entropy, to solve problems relating to energy and heat.	•Note guides	• Magazines and Journals			• Shadowing Programs
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APPLIED CHEMISTRY CURRICULUM**

GRADE 10

PA Academic Standards Student must be able to do	Objective Content or process student will be able to know and do	Instructional Methods	Materials/ Resources Textbooks, trade books, workbooks, software, hardware, etc.	*Assessment Procedures *Additional adaptations, modifications, accommodations, and enrichment/ acceleration will be provided per IEP	*Additional Learning Opportunities for students who do not meet basic standards *Additional adaptations, modifications, and accommodations will be provided per IEP	*Extended Learning Opportunities for students who can go beyond the basic standards. *Additional enrichment/acceleration will be provided per IEP
3.4 Physical Science, Chemistry, and Physics						
C. Apply the principles of motion and force.	• Evaluate wave properties of frequency, wave length and speed as applied to sound and light through different media.	• Direct Instruction • Molecular Models • Partner Work • Group Work • Lab Work • Demonstrations (chemical) • Graphing/Analysis • Computer Projects • Cooperative Learning • Guided/Paired/ independent	• Textbook/ Supplements • PowerPoint • Lab Manual • Periodic Table • Calculators • Handouts • Lab Equipment • Model Kits • Measuring Devices • Computer (classroom) • Computer (lab) • Excel • Chemicals • Internet	• Teacher Observation • Tests • Quizzes • Problem Solving • In-Class Work • Homework • Lab write-ups • Midterms • Final • Notebook check • Rubric • Peer Evaluation	• Review and Re-teach • Small Group Instructions • Access to Learning Support Teachers • Adapted Lessons • Extended Time • Tutoring • Technology	• Additional Reading • Science Competition • Science Fairs • Independent Projects • Field Trips • Science Clubs • Summer Assignments • Internships • Science Honors

		Reading • Note guides	• Magazines and Journals			Institute • Shadowing Programs
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